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OF THE

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1911.—Allen, Carroll W., M.D. 1526 Carondelet St., New Orleans, La.

1905.—Baker, James Norment, M.D. Visiting Surgeon, St. Margaret's Hospital; Secretary of the Medical Association of the State of Alabama. 719 Madison Avenue, Montgomery, Ala.

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1900.—Baldy, John Montgomery, M.D. Professor of Gynecology, Philadelphia Polyclinic; Surgeon to Gynecean Hospital; Consulting Surgeon to Frederick Douglass Free Hospital and to the Jewish Hospital. 2219 De Lancey Place, Philadelphia, Pa.

1903.—Balloch, Edward A., M.D. Professor of Surgery, Medical Department of Howard University; Surgeon to Freedmen's Hospital; Member American Academy of Medicine. 1511 Rhode Island Avenue, N. W., Washington, D. C.

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1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

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1904.—Batchelor, James M., M.D. House Surgeon of Charity Hospital; Associate Professor of Surgery, Tulane University. New Orleans, La.

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1907.—Bevan, Arthur Dean, M.D. Professor of Surgery, Rush Medical College, University of Chicago. 100 State Street, Chicago, Ill.

1908.—Blair, Vilray Papin, A.M., M.D. Metropolitan Building, St. Louis, Mo.

1906.—Bloodgood, Joseph Colt, M.D. Associate Professor of Surgery, Johns Hopkins University; Associate Surgeon, Johns Hopkins Hospital; Surgeon to the Union Protestant Infirmary; Chief Surgeon to St. Agnes' Hospital. *Vice-President,* 1910. 904 North Charles Street, Baltimore Md.

1893.—Bloom, J. D., M.D. Consulting Surgeon, Touro Infirmary; Lecturer on Diseases of Children, Tulane University. New Orleans, La.

1901.—Boldt, Hermann J., M.D. Gynecologist to Post-Graduate Hospital, St. Mark's Hospital, German Polyclinic; Consulting Gynecologist to the Beth Israel Hospital and to St. Vincent's Hospital; Professor of Gynecology, Post-Graduate Medical School; Member of the Gynecological Society of Germany; Fellow of the American Gynecological Society; Fellow of the Royal Society of Medicine (London); ex-President of the New York Obstetrical Society; of the German Medical Society of New York; of the Section of Obstetrics of the New York Academy of Medicine. 39 East Sixty-first Street, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical Department University of Cincinnati); Member American Association of Obstetricians and Gynecologists; ex-President Cincinnati Academy of Medicine; ex-President Cincinnati Obstetrical Society. 409 Broadway, Cincinnati, Ohio.

1911.—Borden, William C., M.D. 1801 California St., Washington, D. C.

1890.—Bosher, Lewis Crenshaw, M.D. Professor of Practice of Surgery and Clinical Surgery in the Medical College of Virginia; Visiting Surgeon to the Memorial Hospital; Member of American Surgical Association; Member of the American Association of Obstetricians and Gynecologists; Member of Association of American Anatomists; Member of

American Urological Association; ex-President of Richmond Academy of Medicine and Surgery. *Vice-President,* 1901; *President,* 1905. 422 East Franklin Street, Richmond, Va.

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1907.—Burch, Lucius E., M.D. Professor of Gynecology, Vanderbilt University, Medical Department; Gynecologist, Nashville City Hospital; Captain and Surgeon, N. G. S. T. 150 Eighth Avenue, N., Nashville, Tenn.

1899.—Burthe, L., M.D. 124 Baronne Street, New Orleans, La.

1900.—Byford, Henry T., M.D. Professor of Gynecology and Clinical Gynecology, College of Physicians and Surgeons (University of Illinois); Professor of Gynecology, Post-Graduate Medical School of Chicago; Surgeon to Woman's Hospital, etc. 122 Michigan Ave., Chicago, Ill.

1902.—Caldwell, C. E., A.M., M.D. Professor of Principles of Surgery, Miami Medical College; Visiting Orthopedic Surgeon, Cincinnati Hospital; Member Cincinnati Academy of Medicine. 110 Cross Lane, Walnut Hills, Cincinnati, Ohio.

1910.—Caldwell, Robert, M.D. Professor of Surgical Anatomy, Vanderbilt University; President Nashville Academy of Medicine. 315 Jackson Bldg., Nashville, Tenn.

1906.—Cannady, John Egerton, M.D. Former Surgeon-in-Charge to Sheltering Arms Hospital, Hansford, W. Va.; Fellow of the American Association of Obstetricians and Gynecologists; Non-resident Honorary Fellow of the Kentucky State Medical Society; Fellow of the West Virginia Medical Association, Virginia Medical Society, Tri-State Society of Virginia and the Carolinas, American Association of Railway Surgeons. Coyle and Richardson Building, Charleston, W. Va.

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1903.—Carr, William P. M.D. Professor of Physiology and Professor of Clinical Surgery, Columbian University; Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Government Hospital for the Insane, Washington, D. C. *Vice-President,* 1912. 1418 L Street, N. W., Washington, D. C.

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1907.—Clark, S. M. D., M.D. Associate Professor Gynecology, Tulane Medical Department; Visiting Surgeon, Charity Hospital. 1435 Harmony Street, New Orleans, La.

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1900.—Deaver, John B., M.D. Surgeon-in-Chief to the German Hospital. 1634 Walnut Street, Philadelphia.

1897.—Dorsett, Walter B., M.D. Professor of Obstetrics and Clinical Gynecology, St. Louis University; Gynecologist to the Missouri Baptist Sanitarium and to Evangelical Deaconess' Hospital. 5070 Washington Boulevard, St. Louis, Mo.

1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

1890.—Earnest, John G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting Gynecologist to the Grady Hospital. 828 Candler Building, Atlanta, Ga.

1907.—Elbrecht, Oscar Herman, M.D. Superintendent and Surgeon-in-Charge of St. Louis Female Hospital; Vice-President, St. Louis Obstetrical and Gynecological Society; Visiting Surgeon on City Hospital Staff. Metropolitan Building, St. Louis, Mo.

1891.—Elkin, William Simpson, M.D. Professor of Operative and Clinical Surgery, Atlanta College of Physicians and Surgeons; ex-President of the Atlanta Society of Medicine; Surgeon to Grady Hospital. 27 Luckie Street, Atlanta, Ga.

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1902.—Freiberg, Albert H., M.D. Professor of Orthopedic Surgery in the Medical College of Ohio, Medical Department of the University of Cincinnati; Orthopedic Surgeon to the Cincinnati Hospital and to the Jewish Hospital of Cincinnati. 19 West Seventh Street, Cincinnati, Ohio.

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Founder.—Goggans, James A., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee; Senior Councillor of the Medical Association of the State of Alabama; Fellow of the British Gynecological Society. *Vice-President,* 1898. Alexander City, Ala.

1900.—Goldsmith, W. S., M.D. *Treasurer.* 262 Jackson Street, Atlanta, Ga.

1892.—Grant, Horace H., M.D. Professor of Surgery in the Hospital College of Medicine; Surgeon to the Louisville City Hospital. 321 Equitable Building, Louisville, Ky.

1905.—Guerry, Le Grand, M.D. Surgeon, Columbia Hospital. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Gynecologist to St. Vincent Hospital and Dispensary. Norfolk, Va.

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1901.—Hazen, Charles M., M.D. Professor of Physiology, Medical College of Virginia. Bon Air (Richmond), Va.

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1905.—Hendon, George A., M.D. Professor of Surgery and Clinical Surgery, University of Louisville. 968 Baxter Avenue, Louisville, Ky.

1889.—Hill, Robert Somerville, M.D. Gynecologist to the Laurel Hill Hospital; Senior Councillor of the Medical Association of the State of Alabama; ex-President of the Montgomery County Medical and Surgical Association; former Surgeon of the Second Regiment, Alabama State Militia. Montgomery, Ala.

1902.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Fellow of College of Physicians, Philadelphia; Gynecologist to the Howard, Orthopedic, and Philadelphia Hospitals; Fellow of American Gynecological Society. 1821 Spruce Street, Philadelphia, Pa.

1911.—Hogan, Edgar P., M.D. 800 South Twentieth St., Birmingham, Ala.

1900.—Hoke, Michael, M.D., B.E. 268 Peachtree Street, Atlanta, Ga.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 223 West Forsyth Street, Jacksonville, Fla.

1891.—Holmes, J. B. S., M.D. Ex-President of the Tri-State Medical Society of Alabama, Georgia, and Tennessee, ex-President of the Georgia Medical Association; Fellow of the American Association of Obstetricians and Gynecologists. *Vice-President*, 1894. Tampa Bay Hotel Park, Tampa, Fla.

1900.—Horsley, John Shelton, M.D. Professor of Principles of Surgery and Clinical Surgery, Medical College of Virginia; Surgeon to Memorial Hospital. *Vice-President*, 1904. 617 West Grace Street, Richmond, Va.

1896.—Hundley, J. Mason, M.D. Associate Professor of Diseases of Women and Children, University of Maryland; President Clinical Society of Baltimore. 1009 Cathedral Street, Baltimore, Md.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University; Professor of Genito-Urinary Surgery, Woman's Medical College of Baltimore; Gynecologist-in-Chief, St. Agnes' Hospital; Visiting Gyne-

cologist, Church Home and Hebrew Hospital, Baltimore, Frederick City Hospital, Frederick, Md., and Hagerstown Hospital, Hagerstown, Md.; Consulting Gynecologist, Brattleboro Memorial Hospital, Brattleboro, Vt. *Vice-President*, 1911. 2305 St. Paul Street, Baltimore, Maryland.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hospital of Newark, N. J.; to All Souls' Hospital, Morristown, N. J., and to Mountain Side Hospital, Montclair N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1908.—Irvin, James S., M.D. Danville, Va.

1889.—Johnson, Joseph Taber, M.D. Professor of Gynecology and Abdominal Surgery, Georgetown University; formerly Gynecologist to Providence Hospital; Chief of Service of Gynecology and Abdominal Surgery, Georgetown University Hospital, and President of the Board of Administration; President of the Woman's Dispensary, and of the Medical Society of the District of Columbia (1887); Member of the British Medical Association; Fellow of the Gynecological Society; President of the Washington Obstetrical and Gynecological Society; Secretary American Gynecological Society, 1886-1890, and President, 1899. *President*, 1899. 926 Farragut Square, Washington, D. C.

Founder.—Johnston, George Ben, M.D. Formerly Consulting Surgeon to the Richmond Eye, Ear, and Throat Infirmary; ex-President of the Richmond Academy of Medicine and Surgery; ex-President of the Medical Society of Virginia; Member of the American Association of Obstetricians and Gynecologists, and First Vice-President, 1896; Member of the Ninth International Medical Congress; Member of the American Surgical Association; Professor of the Practice of Surgery and Clinical Surgery in the Medical College of Virginia, and formerly Professor of Anatomy; Surgeon to the Old Dominion Hospital; Consulting Surgeon to the City Free Dispensary. *Vice-President*, 1892; *President*, 1897. 407 East Grace Street, Richmond, Va.

1908.—Jonas, Ernst, M.D. Clinical Professor of Surgery, Medical Department, Washington University; Chief of Surgical Clinic, Washington University Hospital; Gynecolo-

gist to the Jewish Hospital; Surgeon to the Martha Parsons Hospital for Children; Fellow of the American Association of Obstetricians and Gynecologists. 4495 Westminster Place, St. Louis, Mo.

1910.—Jones, Edward Groves, A.B., M.D. Professor of Surgery, Atlanta School of Medicine; Surgeon to Tabernacle Infirmary. Fourth National Bank Building, Atlanta, Ga.

1902.—Jordan, William Mudd, M.D. Surgeon to St. Vincent's Hospital; Gynecologist to Hillman Hospital; formerly Assistant Surgeon, U. S. Marine Hospital Service. Birmingham, Ala.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888-89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1888-99; Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Member Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member Washington Academy of Sciences; Fellow American Gynecological Society. *President*, 1907. 1418 Eutaw Place, Baltimore, Md.

1907.—Kirchner, Walter C. G., M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital. 508 Metropolitan Building, St. Louis, Mo.

1899.—Kohlman, William, M.D. 3500 Prytania Street New Orleans, La.

1894.—Leigh, Southgate, M.D. Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President Medical Society of Virginia, 1899-1900. 147 Granby Street, Norfolk.

1893.—Lewis, Ernest S., M.D. Professor of Gynecology, Medical Department of Tulane University. *Vice-President*, 1895; *President*, 1896; *Member of Council*, 1896-1903. 124 Baronne Street, New Orleans, La.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon to Post-Graduate Hospital and St. Francis' Hospital, and Consulting Surgeon to the Benedictine Sanitarium at Kingston, N. Y. 12 West Fiftieth Street, New York, N. Y.

Founder.—Long, John Wesley, M.D. Emeritus Professor of Gynecology and Pediatrics in the Medical College of Virginia; formerly Gynecologist to the Old Dominion Hospital and the Richmond City Dispensary; Member, ex-Orator, and ex-Vice-President of the North Carolina Medical Society. *Vice-President,* 1902. Greensboro, N. C.

1904.—Lupton, Frank A., M.D. 716 North Eighteenth Street, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1911.—McGlannan, Alexius, M.D. 2005 Madison Avenue, Baltimore, M.D.

1895.—McGannon, M. C., M.D. Professor of Surgery and Clinical Surgery, Medical Department, Vanderbilt University; Chief Surgeon, Woman's Hospital. 118 Eighth Avenue, N., Nashville, Tenn.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. *President,* 1908. 518 East Grace Street, Richmond Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1905.—MacLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1888.—McMurtry, Lewis S., M.D. Ex-President of the American Medical Association; Professor of Abdominal Surgery and Gynecology in the Medical Department of the University of Louisville; Surgeon to the Louisville City Hospital; Gynecologist to St. Mary and St. Elizabeth Hospital; Gynecologist to Gray Street Infirmary; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Kentucky State Medical Society; Corresponding Member of the Gynecological Society of Boston; Fellow of the British Gynecological Society; Ordinary Fellow of the Edinburgh Obstetrical Society; Fellow of the American Surgical Society. *President,* 1891. Suite 610, The Atherton, Fourth and Chestnut Streets, Louisville, Ky.

1888.—McRae, Floyd Willcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Treasurer*, 1901-1903; *President*, 1904. Peters Building, Atlanta, Ga.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, Edmund Denegre, M.D. Professor of Minor and Clinical Surgery, New Orleans Polyclinic; Visiting Surgeon to the Charity Hospital; Consulting Surgeon to the Eye, Ear, Nose, and Throat Hospital; President Orleans Parish Medical Society; ex-Vice-Pesident American Medical Association. 115 Chartres Street, New Orleans, La.

1909.—Martin, Frank, M.D. Clinical Professor of Surgery at the University of Maryland. 1000 Cathedral Street, Baltimore, Md.

1904.—Mason, J. M., M.D. Gynecologist to St. Vincent Hospital. 1915 Sixteenth Avenue, S., Birmingham, Ala.

1899.—Mastin, William M., M.D. Fellow of the American Surgical Association; Member of the American Association of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medical Department of Tulane University; Fellow of the American Surgical Association. *President*, 1911. 2255 St. Charles Avenue, New Orleans, La.

1896.—Matthews, William P., M.D. Professor of Anatomy, Medical College of Virginia; Orthopedic Surgeon to the Old Dominion Hospital. Richmond, Va.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital; Fellow American Surgical Society; ex-President, Western Surgical and Gynecological Association and of Minnesota State Medical Society. Rochester, Minn.

Founder.—Meriwether, Frank T., M.D. Assistant Surgeon, U. S. A. (Retired). Asheville, N. C.

1899.—Michinard, P. E., M.D. 624 Gravier Street, New Orleans, La.

1888.—Miller, C. Jeff., M.D. Visiting Surgeon to Charity Hospital of Louisiana; Professor of Clinical Obstetrics and Clinical Gynecology in the Tulane University of Louisiana; Chief of the Division of Obstetrics, Gynecology and Abdominal Surgery of the Presbyterian Hospital. 1638 Joseph Street, New Orleans, La.

1907.—Mitchell, James F., M.D. Surgeon to Providence Hospital. 1344 Nineteenth Street, Washington, D. C.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough Street, Boston, Mass.

1910.—Moore, James E., M.D. Professor, and Chief of the Department of Surgery in the College of Medicine and Surgery of the University of Minnesota; Fellow and Ex-Vice-President of the American Surgical Association; Member and Ex-President of the Western Surgical Association; Member and Ex-chairman of the Surgical Section of the American Medical Association; Honorary member of the American Orthopedic Association. 704 Pillsbury Building, Minneapolis, Minn.

1911.—Moore, John Thomas, M.D. 612 Gray Avenue, Houston, Texas.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. 2426 Pennsylvania Avenue, Washington, D. C.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama; Vice-President of Tri-State Medical Society of Alabama, Georgia, and Tennessee. *Vice-President.* 716 North Eighteenth Street, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital. 616 Madison Avenue, New York, N. Y.

1901.—Mullally, Lane, M.D. Professor of Obstetrics and Diseases of Children, Medical College, State of South Carolina; Visiting Physician in Obstetrics and Pediatrics, Roper Hospital. Charleston, S. C.

*1905.—Munro, John Cummings, M.D.

*1891.—Murfree, James Brickle, M.D. Formerly Professor of Surgery, University of the South (Sewanee); ex-President of the Tennessee State Medical Society, of the Tri-State Medical Society of Alabama, Georgia, and Tennessee. Murfreesboro, Tenn.

1894.—Murphy, J. B., M.D. Ex-President American Medical Association; Professor of Surgery, Northwestern University; Professor of Surgery, Post-Graduate School and Hospital; Attending Surgeon, Cook County and Mercy Hospitals. 100 State Street, Chicago, Ill.

**Founder.*—Nash, Herbert Milton, M.D.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons; Visiting Surgeon to Grady Hospital; Senior Surgeon to Wesley Memorial Hospital; Senior Surgeon, St. Joseph Hospital. *Vice-President,* 1900. Prudential Building, Atlanta, Ga.

1896.—Noble, Charles P., M.D. Surgeon-in-Chief, Kensington Hospital for Women; Consulting Surgeon, Woman's Hospital; Lecturer on Gynecology, Philadelphia Polyclinic. 1500 Locust Street, Philadelphia, Pa.

1890.—Noble, George H., M.D. Dean and Professor of Abdominal Surgery and Clinical Gynecology, Atlanta School of Medicine; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President,* 1901; *President,* 1905. 131 South Pryor Street, Atlanta, Ga.

1911.—Norris, Henry, M.D. Rutherfordton, N.C.

1902.—O'Brien, Matthew Watson, M.D. Surgeon, Southern and Chesapeake and Ohio Railways; Member of the American Association for the Advancement of Science. 908 Cameron Street, Alexandria, Va.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1903.—Ochsner Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 710 Sedgwick Street, Chicago, Ill.

1904.—Oechsner, John F., M.D. Professor of Orthopedic Surgery and the Surgery of Children, Post-Graduate Medical Department, Tulane University of Louisiana; Visiting Surgeon, Charity Hospital. Macheca Building, New Orleans, La.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899; *President*, 1908. 1429 Seventh Street, New Orleans, La.

1900.—Park, Roswell, M.D. Professor of Surgery, Medical Department, University of Buffalo; Surgeon, Buffalo General Hospital; Member of German Congress of Surgeons, Italian Surgical Society, American Surgical Association, American Orthopedic, and American Genito-urinary Associations. 510 Delaware Avenue, Buffalo, N. Y.

1910.—Payne, Robert Lee, Jr., M.D. Assistant Gynecologist to St. Vincent's Hospital; Surgeon to the Southern Railway; Consulting Surgeon to the Seaboard Air Line Railway. 300 Freemason St., Norfolk, Va.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. Macheca Building, 830 Canal Street, New Orleans, La.

1908.—Peterson, Reuben, A.M., M.D. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist-in-Chief to the University of Michigan Hospital. Ann Arbor, Mich.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1889.—Polk, William M., M.D. Dean and Professor of Obstetrics and Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Consulting Surgeon to St. Luke's, St. Vincent's, New York Lying-in, and Trinity Hospitals; ex-President of American Gynecological Society, and New York Obstetrical Society. 7 East Thirty-sixth Street, New York.

1900.—Porter, Miles F., M.D. Fellow American Surgical Association. 207 West Wayne Street, Fort Wayne, Ind.

*1889.—Potter, William Warren, M.D.

*1889.—Price, Joseph, M.D.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, University of Cincinnati; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1911.—Reder, Francis, M.D. 4629 Cook Avenue, St. Louis, Mo.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. "The Gaston," Cincinnati, Ohio.

1900.—Rees, Charles Mayrant, M.D. Professor of General and Clinical Surgery in the Medical College of the State of South Carolina; Visiting Surgeon to Roper Hospital; Gynecologist to Roper Hospital Polyclinic Medical School; Gynecologist to Shiras Dispensary; Commissioned First Lieutenant Medical Reserve Corps, U. S. A.; Member of the American Association of Obstetricians and Gynecologists, and Association of Military Surgeons of the United States. 89½ Wentworth St., Charleston, S. C.

1899.—Richardson, Maurice Howe, M.D. Mosely Professor of Surgery, Harvard University; Surgeon-in-Chief, Massachusetts General Hospital. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *President*, 1910; *Vice-President*, 1889. 1520 Third Street, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Professor of

Gynecology, Medical College of Virginia; Gynecologist to the Memorial Hospital; Surgeon to the Atlantic Coast Railroad. 8 West Grace Street, Richmond, Va.

1889.—Robinson, William Lovaille, M.D. Fellow of the American Association of Obstetricians and Gynecologists; ex-President of the Danville Medical Society; Member of the Medical Examining Board of Virginia; ex-President of Virginia Medical Society. *Vice-President*, 1899. 753 Main Street, Danville, Va.

1906.—Rogers, Carey Pegram, M.D. Chief of Surgical Staff, St. Luke's Hospital; Consulting Surgeon, Sea Board Air Line Railway. 221 Laura Street, Jacksonville, Fla.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Ala.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University, College of Medicine; Consulting Surgeon, Parkland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical Association; Vice-President, Tri-State Society of Texas, Louisiana and Arkansas. *Treasurer*, 1904–07. 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert A., A.B., M.D. Professor of Gynecology and Dean of the Faculty, Medical Department University of North Carolina; Gynecologist to Rex Hospital; Surgeon-in-Chief, St. Agnes' Hospital. *Vice-President*, 1907. 423 Fayetteville Street, Raleigh, N. C.

1909.—Ruffin, Kirkland, M.D. Surgeon-in-Charge of St. Christopher's Hospital. 218 York Street, Norfolk, Va.

1901.—Runyan, Joseph P., M.D. 203 West Second Street, Little Rock, Ark.

1908.—Russell, Wm. Wood, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Gynecologist to Union Protestant Infirmary, Baltimore. Baltimore, Md.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President, Texas State Medical Association. *Vice-President*, 1903; *Member of Council*, 1908. Ninth and Houston Streets, Fort Worth, Texas.

1910.—Schachner, August, M.D. 844 Fourth Avenue, Louisville, Ky.

Founder.—Schilling, Nicholas, M.D. Cedar Bayou, Tex.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon, Temple Sanatorium. Temple, Texas.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the Emergency Hospital, and Central Dispensary; Charter Member Washington Academy of Sciences; Member American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Consulting Surgeon to Louisville Hospital. *Vice-President*, 1911. 633 St. Charles Place, Louisville, Ky.

1893.—Simons, Manning, M.D.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist to Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. Jenkins Arcade Building, Pittsburgh, Pa.

1899.—Smythe, Frank David, M.D. Gynecologist to St. Joseph's and City Hospitals; Professor of Gynecology, Didactac and Clinical, in the Memphis Hospital Medical College; Ex-President West Tennessee Medical and Surgical Association; formerly Member of the Mississippi State Board of Health and State Board of Medical Examiners of Mississippi. Porter Building, Memphis, Tenn.

1904.—Stokes, James Ernest, M.D. Salisbury, N. C.

Founder.—Stone, Isaac Scott, M.D. Clinical Professor Gynecology, Georgetown University; Gynecologist to Columbia Hospital, and Associate Gynecologist to Georgetown University Hospital; Member American and British Gynecological Societies; Honorary Fellow of Medical Society of the State of New York; Fellow of the Medical Society of Virginia; Member Washington Academy of Sciences; Washington Obstetrical and Gynecological Society. 1618 Rhode Island Avenue, N. W., Washington, D. C.

1894.—Talley, Dyer F., M.D. Associate Professor of Surgery, Birmingham Medical College; Attending Surgeon to Hillman Hospital; Surgeon to the Talley and McAdory Infirmary; Ex-President of the Jefferson County Medical Society; Member of the Southern Medical Association; Mem-

ber of the Pan-American Medical Association; Member of the Alumni Association of the Charity Hospital of Louisiana; Member of the Board of Censors of the Jefferson County Medical Society; Member of the Alabama State Board of Censors, Committee of Public Health and Examiners; Fellow of the American Association of Obstetricians and Gynecologists. 1801 Seventh Avenue, Birmingham, Ala.

Founder.—TAYLOR, HUGH M., M.D. Professor of Practice of Surgery and Clinical Surgery, University College of Medicine; Surgeon to the Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. 6 North Fifth Street, Richmond, Va.

1898.—TAYLOR, WILLIAM WOOD, A.B., M.D. Gynecologist to St. Joseph's and the Memphis City Hospitals. 246 Randolph Building, Memphis, Tenn.

1892.—THOMPSON, J. E., M.D. Professor of Surgery in the University of Texas. *Vice-President,* 1912. Galveston, Tex.

1890.—TOMPKINS, CHRISTOPHER, M.D. Professor of Obstetrics in the Medical College of Virginia. *Vice-President,* 1903. 116 East Franklin Street, Richmond, Va.

1908.—TORRANCE, GASTON, M.D. Member Surgical Staff, Hillman's Hospital; also the Sisters' Hospital and St. Vincent's; Fellow of the American Association of Obstetricians and Gynecologists. 325 to 328 Woodward Building, Birmingham, Ala.

1909.—TROUT, HUGH HENRY, M.D. Surgeon-in-Chief of Jefferson Surgical Hospital, Roanoke, Va. 1303 Franklin Road, Roanoke, Va.

1888.—TUHOLSKE, HERMAN, M.D. Professor of Surgery, Medical Department, Washington University; Consulting Surgeon, St. Louis City Hospital; Surgeon to St. Louis Polyclinic Hospital. 465 North Taylor Street, St. Louis, Missouri.

1905.—VANCE, AP MORGAN, M.D. Surgeon to St. Mary and Elizabeth Hospital; Consulting Surgeon, Louisville City Hospital. 921 Fourth Street, Louisville, Ky.

1893.—VANDER VEER, ALBERT, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; ex-President of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, New York.

1909.—Vaughan, George Tully, M.D. Professor of Surgery and Head of Department of Surgery in Georgetown University; Chief Surgeon in Georgetown University Hospital; Visiting Surgeon to the Emergency Hospital; Consulting Surgeon to the Government Hospital for the Insane. 1718 I Street, Washington, D.C.

1891.—Walker, Edwin, M.D., Ph.D. Gynecologist to the Evansville City Hospital; ex-President Mississippi Valley Medical Association; President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. 712 Upper Fourth Street, Evansville, Ind.

1911.—Waring, T. P., M.D. Savannah, Ga.

1905.—Wathen, John R., A B., M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, University of Louisville; Surgeon to St. Anthony's, Louisville City, and University of Louisville Hospitals. 628 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief and Director of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1901.—Werder, X. O., M.D. Gynecologist, Mercy Hospital, Pittsburgh: Professor of Gynecology, West Pennsylvania Medical College; Consulting Surgeon to the South Side Hospital, Allegheny General Hospital, St. Francis' Hospital, etc. 524 Pennsylvania Avenue, Pittsburgh, Pa.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice President*, 1908. 241 Equitable Building, Atlanta, Ga.

1904.—Whaley, T. P., M.D. Lecturer on Genito-urinary and Renal Surgery, Charleston Medical School; Lecturer on Diseases of Skin, Medical College of State of South Carolina; Surgeon to Sherra's Dispensary; Visiting Surgeon, Charleston City Hospital. 13 Wentworth Street, Charleston, S. C.

1902.—Whitacre, Horace J., M.D. Professor of Pathology and Lecturer on Surgery, Medical Department, University of Cincinnati, also Medical College of Ohio; Surgeon to Christ Hospital; Consulting Surgeon to Speer's Hospital. 22 West Seventh Street, Cincinnati, Ohio.

1900.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief, Johns Hopkins Hospital; Gynecologist to the Union Protestant Infirmary. 1128 Cathedral Street, Baltimore, Md.

1907.—Willis, A. Murat, M.D. Instructor in Abdominal Surgery, Medical College of Virginia; Junior Surgeon to Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

1905.—Winslow, Randolph, M.D., LL.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member of American Association of Anatomists. 307 West Granite Street, Butte, Mont.

1900.—Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Chief of Clinic, Genito-urinary Surgery, Johns Hopkins Hospital. 330 North Charles Street, Baltimore, Md.

1902.—Zinke, E. Gustav, M.D. Professor of Obstetrics and Clinical Gynecology in the Ohio-Miami Medical College, the Medical Department of the Cincinnati University; Obstetrician and Gynecologist to German Protestant Hospital; Attending Obstetrician to Ohio Maternity; ex-President of American Association of Obstetricians and Gynecologists. 4 West Seventh Street, Cincinnati, Ohio.

Total, 199.

CONSTITUTION

ARTICLE I

The name of this Association shall be The Southern Surgical and Gynecological Association.

ARTICLE II

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV

Section 1. Any reputable physician who practises surgery or gynecology, and who is vouched for by two members of the Association and recommended by the Council, shall be eligible to membership in this body.

Sec. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V

Section 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

Sec. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for reëlection at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX

The membership of the Association shall be limited to two hundred.

BY-LAWS

ARTICLE I

The Southern Surgical and Gynecological Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs, at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II

The members present shall constitute a quorum for business.

ARTICLE III

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for the sum of $500, for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the members of the Association, and urge their attendance.

ARTICLE IX

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X

COUNCIL

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. No member of the Council shall be eligible for reëlection. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided,* that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV

No paper read before this Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Council.

ARTICLE XVI

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

TWENTY-FOURTH ANNUAL MEETING

OF

THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

HELD AT

THE SHOREHAM HOTEL

Washington, D. C.

DECEMBER 12, 13, AND 14, 1911

TWENTY-FOURTH ANNUAL MEETING

First Day.—*Tuesday, December* 12, 1911

The following-named members were present:

Baldridge, Felix E.
Baldy, J. M.
Balloch, E. A.
Barr, Richard A.
Bartlett, Willard
Baughman, Greer
Bloodgood, Joseph E.
Boldt, Herman J.
Bosher, Lewis C.
Bovée, J. Wesley
Brown, John Young
Bryan, Robert C.
Byford, Henry T.
Caldwell, Robert
Carothers, Robert
Carr, William P.
Cathcart, R. S.
Clark, John G.
Clark, S. M. D.
Coffey, Robert C.
Crile, George W.
Crisler, Joseph A.
Cullen, Thos. S.
Cushing, Harvey
Davis, John Staige
Dorsett, Walter B.
Doughty, W. H.
Finney, J. M. T.
Fort, Rufus E.
Frank, Louis
Frieberg, Albert H.
Fry, Henry D.
Gavin, G. E.
Grant, Horace H.
Guerry, Le Grand
Gwathmey, Lomax
Haggard, William David
Hagner, Francis R.
Hanes, Granville
Hendon, George A.
Hill, Robert S.
Hirst, Barton C.
Hundley, J. Mason
Hunner, G. L.
Irvin, James S.
Johnston, George Ben
Johnston, Joseph Taber
Jones, Edward G.
Jordan, William M.
Kirchner, W. C. G.
Kohlman, William
Leigh, Southgate
Lloyd, Samuel
Long, John W.
McGuire, Stuart
MacLean, H. S.
McMurtry, Lewis S.
McRae, F. W.

Marcy, Henry O.
Martin, E. D.
Martin, Frank
Matas, Rudolph
Mayo, Charles
Meriwether, F. T.
Mitchell, James F.
Mixter, S. J.
Moore, J. E.
Moran, J. F.
Morris, Lewis C.
Morris, Robert T.
Murphy, J. B.
Noble, George H.
Payne, Robert Lee
Platt, W. B.
Porter, Miles F.
Ransohoff, Joseph
Reed, C. A. L.
Richardson, M. H.
Robert, W. O.
Robins, C. R.
Rogers, Carey P.
Royster, H. A.
Ruffin, Kirkland
Saunders, Bacon
Schachner, August
Scott, A. C.
Shands, A. R.
Sherrill, J. Garland
Simpson, F. F.
Smythe, Frank D.
Stokes, James E.
Stone, I. S.
Talley, D. F.
Thompson, J. T.
Trout, H. H.
Vander Veer, Albert
Vaughan, George Tully
Wathen, J. R.
Watts, Stephen H.
Willis, A. M.
Winslow, Randolph
Witherspoon, T. C.
Young, H. H.
Zinke, E. Gustav

Total present, 104.

Letters and messages of regret were received from the following Fellows who were unable to attend the meeting, J. E. Cannaday, William Polk, Ernest Jonas, Herman Tuholske: H. A. Kelly, J. D. S. Davis, Reuben Peterson, Edward J. Ill, C. Jeff Miller, and W. S. Goldsmith.

Morning Session.—The Association met in the Assembly Hall of Hotel Shoreham, and was called to order at 9.30 A.M. by the Chairman of the Comittee of Arrangements, Dr. J. Wesley Bovée.

Dr. Bovée stated that Mr. Rudolph, Commissioner of the District of Columbia, was unable to be present and had, therefore, delegated Mr. Daniel J. Callahan, First Vice-President of the Chamber of Commerce, to deliver the Address of Welcome which had been prepared by the Commissioner.

Mr. Callahan then read the following:

ADDRESS OF WELCOME BY MR. RUDOLPH

I deem it a privilege to appear before you this morning, representing the municipal government and the citizens of the capital of forty-eight sovereignties, and bid you welcome. And I assure you I do not do so in a perfunctory way, but with a deep sense of pleasure and appreciation that you have selected for your twenty-fourth annual session your and our Washington.

That your sessions will be interesting and instructive there is no doubt. When I use the word "interesting" I mean it in its fullest interpretation, for even the layman has long ago awakened to the fact that it is that branch of the honorable profession which you so well practice that has done so much to mitigate the sufferings of mothers, wives, and sisters. The time was, not so many years ago, in fact within my memory, when all our own and our loved ones' ills and pains could be ministered to only by the old family practitioner. He—dear, sympathetic soul, God bless him—knew nothing of the splendid modern technique, of the great possibilities, nay, miracles, that have been accomplished by the gynecologist and surgeon. He did his best to banish pain, the misery, the sleepless nights, and restore woman to health, that she might again assume her duties and responsibilities in the home; but, how rarely did he succeed. How rarely was his skill and knowledge sufficient to aid thus in reëstablishing a happy home. Truly you are of the men who daily demonstrate the truth of the utterance of the savant of over two thousand years ago: "There is but one good, namely, knowledge, and but one evil, namely, ignorance."

Admittedly you have accomplished and are constantly accomplishing astounding feats in the practice of your specialty, and the end is not yet. Such gatherings as this will expedite the realization of further triumphs and will prove a potent factor in producing other Listers and Simses to mark the way in an evolutional sense that leads and will continue to lead to the goal where is inscribed "Ne Plus Ultra."

Again, let me assure you that you are more than welcome in our midst, and if the authorities and the citizens of the District of Columbia can do anything to enhance the pleasure of your visit you will find that they stand ready to do it and do it gladly. I hope you may find time apart from your serious deliberations to see something of our capital, about which I

modestly express the belief that there is "lots to be seen that's worth while." You must not forget that your interest in Washington is proprietary as well as governmental; the holdings of the nation here are considerable. You may bear in mind that the municipal affairs are directed by three Commissioners appointed by the President of the United States. While Congress is vested with exclusive legislation here, it has seen fit to entrust these Commissioners with authority to make regulations in the nature of the ordinances of councils in other municipalities, and otherwise to care for the district. You will be pleased I hope with the noble departmental structures and contiguous parks that show the hand of the national government in the physical making of this already fine capital, and pleased, too, I hope, with the system and development manifesting our municipal stewardship. I hope when you depart you will carry with you only the happiest recollections of your National Capital.

Following the address of Commissioner Rudolph, Dr. Joseph Taber Johnson was introduced and delivered an address of welcome on behalf of the medical profession of Washington.

ADDRESS OF WELCOME BY DR. JOHNSON

Mr. President and Gentlemen of the Southern Surgical and Gynecological Association: The Chairman of your Committee of Arrangements has requested me to say a few words of welcome to you this morning, and I obey what amounts to his command with a great deal of pleasure.

This pleasure is increased on account of the fact that I have unfortunately been prevented from attending the last three meetings of our Association, and enjoying these reunions which form such agreeable and profitable parts of our annual assembling of ourselves together.

How different it is today with a number of our less—or who can tell if not more—fortunate Fellows who have passed on before us to that great undiscovered country from whose bourne no traveller returns. I refer with a sense of great personal loss as well as to our association to the sad fact that Douglas, Engelmann, Joseph Price, and Manning Simons will meet with us no more.

I am doubly glad to be here this morning to give voice to

the sentiments of our resident Fellows as well as of the entire medical profession of Washington in welcoming you and the ladies of your families to the city in which we live.

In an able and eloquent address, the late lamented Dr. Busey welcomed you on a former occasion when you honored us by meeting in Washington in which he gave in great detail a statement of our city's rise and progress from a struggling country village to the magnificent proportions which you now see in all directions.

Those who are interested in our municipal statistics are referred to that comprehensive address for information as to the number of miles of concrete streets we have, the number of city and suburban electric roads we possess, the number of churches, asylums, hospitals, schools, colleges, and universities, art galleries, theatres, museums, libraries, and our beautiful parks, private and public buildings.

In one respect our city, to which we so cordially welcome you, differs from all other cities in this country, in the fact that it is the capital city of the nation and is therefore just as much yours as it is ours, it having been partly built and is partly supported by public money.

It is the temporary home of your senators and representatives, and we the local members of this Association in extending to you the warmest and heartiest kind of a welcome, feel somewhat like a part of a family greeting another part of the same family when they return to their homes for a Thanksgiving dinner or to the Christmas festivities.

We of the committee have tried to arrange some little events between your feasts of reason and our hearts prompted us to greater elaboration in that line, but your very practical and business-like secretary would only allow us the time for one luncheon and a smoker on the last night after your final adjournment.

Our ladies, however, not being under the control of our tyrannical executive officer have arranged some entertainments for your ladies, and they will be greatly pleased if some of you, at least, will find it possible to break away from the exactions of professional obligations and honor them with your presence at some of their luncheons and receptions.

We feel very sure that from the fifty papers listed in your program the intellectual part of your meeting will be a grand success and that your volume of TRANSACTIONS for 1911 will

be equal to, if not superior, to any of the twenty-three volumes already published.

It is of course unnecessary for me to draw your attention to the frequently mentioned fact that they vie favorably in general style, matter, and value with the transactions of any society in the world.

With the hope that you may have a most pleasant and profitable meeting, and that upon your return to your homes you may find no cause for regret for your short absence and that you may carry with you such pleasant recollections of your visit as to induce you to come again, in the name of the Washington Fellows of this Association, and of our profession generally, I say again to you welcome and doubly welcome.

At the close of Dr. Johnson's remarks, Dr. Bovée introduced the President, Dr. Rudolph Matas, New Orleans, Louisiana, who made the following introductory remarks:

INTRODUCTORY REMARKS BY DR. MATAS

Fellow Members of the Southern Surgical and Gynecological Association: The eventful moment has come when your annual and self-appointed labors must begin. It is most gratifying at the outset of our reunion to greet so many distinguished and busy workers, who, hurrying from distant fields of absorbing professional labor, have responded so punctually to the call of the parent organization; who in obedience to the same thought and to the same generous impulse have hastened to the trysting place to prove their loyalty to the cause of surgical progress and to exchange the greetings of a genial fellowship.

To each and all of you I extend a hearty welcome in behalf of the officers whom you have intrusted with the responsible duty of providing for the organization of this meeting, and whom you have made happy by the unmistakable evidence of your earnest support and collaboration. Your promised contributions as they appear on the program, replete with the most varied, most substantial and freshest brain products of the surgical market, should satisfy the appetite of the most voracious or the most fastidious among you.

We feel especially grateful to the eminent men residing far away in the North, East, and West of our territory, who have

continued to honor us with their presence, and who have come to share with us the rich harvest of their well-culled professional studies and observations. Theirs is the privilege to prove that there are no geographical boundaries in the domain of surgical science, and no sectional lines drawn between the believers of the same faith, the followers of the same creed who know no rest in the tireless pursuit of knowledge that can redound to the benefit or alleviation of suffering mankind.

In recalling what we of the South owe to the eminent men of other sections, who for years have identified themselves with the work of this Association, I am painfully made to realize that the year which is about to close has wrought sad havoc in our ranks. In vain I scan the faces in front of me for their familiar and cheering smile of recognition, in vain shall I seek for the stimulus and encouragement that came with the presence of such stalwarts as William Warren Potter, of Buffalo, whose name for twenty-two years graced our roll call; of Joseph Price, who, though a Philadephian by adoption, during the eighteen years of his membership so forcefully recalled his Virginian birth and heritage; of Alexander Hugh Ferguson, of Chicago, who also gave us his powerful support for the same period of time. With these three, whom we always hailed with pride and delight, as brothers by adoption and by the ties of a common fellowship, we are also called to mourn the loss of three of our oldest and most valuable Southern representatives, Dr. Herbert Milton Nash, a venerable Virginian, aged seventy-nine years, who, responding to the first call of our organization, became a founder twenty-four years ago; Dr. George Roswell Dean, of Spartanburg, South Carolina, aged sixty-six years, whose career as a member of this Association was closed by death at the expiration of twenty years of membership, and finally Dr. Manning Simons, of Charleston, South Carolina, who succumbed at the age of sixty-four, when he had completed eighteen years of membership. His great personal services as a medical leader, educator, and organizer in his own State, and his professional attainments and personal worth elected him President of this Association in 1901. Nash, Dean, and Simons constituted a noble triumvirate of Southern cavaliers of the traditional type, all three preëminent as accomplished gentlemen and exemplary surgeons and, in addition, Confederate veterans possessed of all the heroic attributes that are associated in every Southern breast with this honored name.

As the trusted representatives of surgery in their respective States and communities, and by their achievements, they added dignity and renown to our deliberations. In mourning the loss of these six splendid men and invaluable co-workers, I recall a thought suggested by a distinguished French philosopher, who once said, "The acts of the living are largely governed by the dead," a true thought that may be comforting to the survivors. And let us not deceive ourselves. If we seem taller, and see farther and more clearly than our predecessors, it is only because they are carrying us upon their shoulders and have thus given us a better point of vantage.

It would be a grateful task to dwell at length upon the lives of the friends and associates whose presence we miss today—but this privilege has been assigned by official custom to others, who will appropriately perpetuate their names and their deeds in our transactions.

In reverently repeating with the ecclesiastic "sursum corda" we bid our departed comrades a last farewell. *Vale, æternamque vale!*

We again meet in Washington, the beautiful and hospitable Capital of the American Federation; the pivotal centre from which radiate the powerful impulses that govern, harmonize, and centralize the varied and multifarious interests of our vast country.

It is not only a delightful experience to meet in Washington, where the most ample provision has been made for our comfort by the resident members, whose generosity and hospitality appear to be as boundless and enduring as time itself—but this meeting affords an opportunity to express our warmest thanks, as well as to testify to our lasting appreciation of their constant fidelity and active coöperation in furthering the interests of our organization.

This Association is a circulating body, and as such is it not proper and perfectly physiological that like the blood which is warmed and moved onward on its vitalizing mission to the most distant parts of the organism, that this Association should likewise include in its circuit the great heart which throbs and pulsates with the very life that quickens and nourishes the pulses of the nation?

It should be remembered that the Southern Surgical and Gynecological Association was originally organized not only to foster the ties of comradeship which bind together the men

of the same calling, but it was also created to stimulate and invigorate the scattered votaries of the art and science of surgery in the various centres of population and learning which are included in the territorial boundaries of our Southern country. For this reason it has no fixed domicile, but like the peripatetic philosophers of ancient Greece, travels about from station to station, sowing seed wherever it goes. Therefore, while sectional in its territorial limitations and aiming primarily at the diffusion and elevation of surgery in the South, this Association provides a forum where the specialists in our States may acquire as well as dispense knowledge—this function being exercised solely that the surgeons who have been less favored by opportunity and experience, than those in older and more established communities, may join with their comrades of the North, East, and West—who are similarly organized—in eliminating sectional differences and distinctions so that in the end there will be no distinctly Northern, Southern, Eastern, or Western surgeons in any qualifying sense, save the geographic.

It is surely not the aim of this Association, or of any similar organizations which have since sprung up in different territorial divisions of our country, to create or encourage distinctive or, as the English would say, provincial types of surgery or of surgeons, but to utilize the resources of each section to the best advantage, in order that a national type—the American surgeon—may be evolved and invested with the highest attributes of his calling.

This we must agree is one of the chief purposes of our organization, in addition to those of a social and fraternal character which are inherent and indispensable in any such aggregation of men. No one will question that this lofty purpose is well served by your teaching and example.

I shall not trespass on your indulgence further than to reiterate the grateful expression of my heartfelt thanks for the great distinction which you saw fit to confer upon me when you elevated me to the high post which I now occupy; an honor which I prize the more highly as I realize my own shortcomings and the strength that you have given me by your good-will and support.

By the program that you have provided, I feel assured that one year more of fruitful endeaver and achievement will be added by the present session to the twenty-four lustrous years of fruitful toil that the Southern Surgical and Gynecological

Association may rightfully claim to its credit in the history of Southern, nay of American surgery.

Dr. Bovée, as Chairman of the Committee of Arrangements, stated that at 1 P.M. today (Tuesday), the Washington Fellows would give the members and guests a luncheon at the Hotel Shoreham, and on Wednesday evening, after addresses by President Matas and Dr. Charles A. L. Reed, a smoker would be given at Rausch's.

Dr. Bovée stated that Tuesday, 10 A.M., the ladies of the Reception Committee would meet the visiting ladies of the Southern Surgical and Gynecological Association in the parlor of the Shoreham. Tuesday, at 5 P.M., Mrs. I. S. Stone and the ladies of the Committee would be At Home to the visiting ladies and members of the Association at 1618 Rhode Island Avenue.

Wednesday, 9.45 A.M., the ladies of the Reception Committee cordially invited all visiting ladies of the Association wishing to take a motor trip about Washington to meet them in the Shoreham Hotel parlor.

Wednesday, 1.30 P.M., Mrs. Francis R. Hagner, 1824 Nineteenth Street, N. W., would entertain the ladies at luncheon.

Wednesday, 5 P.M., Mrs. J. F. Mitchell, At Home to the ladies of the Association, 1344 Nineteenth Street.

Thursday, 9.30 A.M. Mrs. Fry, Mrs. Vaughan, and Mrs. Shands invited the ladies to be their guests upon a trip to Mount Vernon, and would meet them at the Mount Vernon Railway Station.

Dr. Bovée moved that the members of the Washington Surgical Society and Washington Obstetrical Society and Gynecological Society be invited to take part in the deliberations of the Association.

Motion seconded and carried.

Papers were read as follows:

1. "The Effect of Ligation of the Ureters, with Experimental Report," by Dr. Louis Frank, Louisville, Kentucky.

Discussed by Drs. Vander Veer, Morris (Robert T.), Bovée, Royster, Hunner, Barr, Coffey, Balbridge, and in closing by the author of the paper.

2. "Hysterectomy," by Dr. Richard A. Barr, Nashville, Tennessee.

This paper was discussed by Drs. Boldt, Carr, Hunner, and in closing by the author of the paper.

3. "Cancer of the Sigmoid and Rectum," by Dr. Niles F. Porter, Fort Wayne, Indiana.

Discussed by Drs. Bloodgood, Lloyd, Mayo, and in closing by Dr. Porter.

4. "Where Should the Line be Drawn between Medicine and Surgery, in Borderline Cases?" by Dr. James E. Moore, Minneapolis, Minnesota.

Discussed by Drs. Boldt, Lloyd, Mayo, Hill, and in closing by the essayist.

5. "Plastic Operation for Prolapsus Uteri Without the Necessity for Abdominal Section or for Distortion of Anatomical Relations," by Dr. Barton Cooke Hirst, Philadelphia, Pa.

Discussed by Drs. Bovée, Gavin, Noble, and discussion closed by Dr. Hirst.

6. "The Colon Bacillus, A Regulator of Population," by Dr. Robert T. Morris, New York City.

Discussed by Drs. McMurtry, Winslow, Carr, and in closing by the essayist.

On motion, the Association adjourned until 2 P.M.

Afternoon Session.—The Association reassembled at 2 P.M., and was called to order by the President.

7. "Benign Lesions of the Sigmoid Colon, Ptosis, Mesenteritis, Diverticulitis, and Volvulus; Second Beport, with Lantern Illustrations," by Dr. Joseph C. Bloodgood, Baltimore, Maryland.

Discussed by Drs. Mayo, Hunner, Royster, Mixter, Noble, Stone, and the discussion closed by the essayist.

8. "Case of Soft Fibroma of the Stomach," by Dr. E. Balloch, Washington, D. C.

9. "Pyloric Stenosis from Overgrowth of Scar Tissue; Gastric Keloids," by Dr. Willam M. Jordan, Birmingham, Alabama.

10. "Surgical Treatment of Congenital Hypertrophic Pyloric Stenosis with Report of a Case," by Dr. G. Edward Gavin, Mobile, Alabama.

These three papers were discussed together by Drs. Thompson, Balbridge, Moore, and in closing by the essayists.

11. "The Principles Underlying the Surgical Treatment of Gastrointestinal Stasis, Due to Causes other than Strictural and Ulcerative Conditions," by Dr. R. C. Coffey, Portland, Oregon.

12. "What Can Surgery Do for Gastro-visceroptosis?" by Dr. Joseph Ransohoff, Cincinnati, Ohio.

13. "Further Evidences of a Toxic Cause in the Production of Acute Dilatation of Stomach," by Dr. T. C. Witherspoon, Butte, Montana.

14. "Postoperative Gastric Dilatation," by Dr. G. A. Hendon, Louisville, Kentucky.

These four papers were discussed jointly by Drs. Morris, Bloodgood, Gavin, Vander Veer, Sherrill, and the discussion closed by Drs. Coffey and Ransohoff.

15. "Abdominal Cesarean Section for Eclampsia; its indications and Report of Cases," by Dr. John F. Moran, Washington, D. C.

Discussed by Drs. Zinke, Hill, Fry, Dorsett, Haggard, and in closing by the essayist.

On motion, the Association adjourned until 9 A.M. Wednesday.

SECOND DAY.—*Wednesday, December* 13, 1911

Morning Session.—The Association met at 9.30 A.M., and was called to order by the President.

16. "The Lane Operation, the Indications for, and the Limitations of the Procedure, with a Discussion of the Principles Underlying it," by Dr. John Young Brown, St. Louis, Missouri.

Discussed by Drs. Coffey, Moore, Schachner, Reed, Noble, and discusson closed by the essayist.

17. "Parathyroids and Their Relation to the Surgery of Goitre," by Drs. Charles H. Mayo, and Bernard McGrath (by invitation), Rochester, Minnesota.

18. "The End Results of Surgical Treatment in Graves' Disease," by Dr. George W. Crile, Cleveland, Ohio.

These two papers were discussed by Drs. Sherrill, Porter, Hill, Vander Veer, Haggard, Long, Moore, Crisler, Schachner, and in closing by Drs. Mayo and Crile.

19. "Report on the Procedure of Omentopexy for Cirrhosis of the Liver," by Dr. H. H. Grant, Louisville, Ky.

20. "Intestinal Obstruction Due to Gallstones with Report of Cases," by Dr. Frank Martin, Baltimore, Maryland.

21. "Primary Sarcoma of the Gall-bladder," by Dr. R. S. Cathcart, Charleston, South Carolina.

These three papers were discussed together by Drs. Thompson, Vaughan, Bloodgood, Murphy, and the discussion closed by Drs. Martin and Cathcart.

22. "A Case of Congenital Gangrene of the Forearm, with Successful Amputation in an Infant Five Days Old," by Dr. Randolph Winslow, Baltimore.

The case was discussed by Drs. Murphy, Morris, Porter, Coffey, and in closing by the essayist.

On motion, the Association adjourned until 2 P.M.

Afternoon Session.—The Association reassembled at 2 P.M., and was called to order by the Vice-President, Dr. Hunner.

23. "Wherein the Diagnosis of Pellagra is of Surgical Importance; A Personal Experience," by Dr. Le Grand Guerry, Columbia, South Carolina.

Discussed by Drs. Finney, Royster, Bobins, Jordan, Balbridge, and in closing by the essayist.

24. "The Limitations of Bone Regeneration and Joint Reconstruction," by Dr. John B. Murphy, Chicago, Illinois.

Discussed by Drs. Halsted (by invitation), Brophy (by invitation), and Bloodgood.

25. "Codivilla's Method of Lengthening the Lower Extremity."

26. "The Matas Operation in the Treatment of Traumatic Aneurysm," by Dr. Walter C. G. Kirchner, St. Louis, Missouri.

27. "The Wiring of Inoperable Aneurysms of the Aorta, with Report of Cases," by Dr. J. M. T. Finney, Baltimore.

The papers of Drs. Kirchner and Finney were discussed together by Drs. Ransohoff, Winslow, Carr, Matas, Sherrill, and the discussion closed by the essayists.

The President appointed as an Auditing Committee to audit the accounts of the Secretary and Treasurer, Drs. F. E. Balbridge, G. A. Hendon, and Le Grand Guerry.

In the absence of Dr. Howard A. Kelly, on account of illness, the President appointed Dr. George H. Noble to serve on the Council.

28. "An Experimental Study of the Arteries in Shock," by Dr. Willard Bartlett, St. Louis, Missouri.

29. "Crile's Researches in Regard to Shock; Some Clinical Facts Tending to Confirm his Conclusions," by Dr. W. P. Carr, Washington, D. C.

These two papers were discussed by Drs. Crile and Leigh.

30. "A Suggestion in Rhinoplasty," by Dr. E. Denegre Martin, New Orleans, Louisiana.

31. "An Artistic and Mathematically Accurate Method of Repairing a Defect in Cases of Harelip," by Dr. James E. Thompson, Galveston, Texas.

These two papers were discussed by Dr. Brophy (by invitation), and the discussion closed by the essayists.

On motion, the Association then adjourned until 7.30 P.M.

Evening Session.—The Association reassembled at 8 P.M., and was called to order by Vice-President Hunner.

President Matas was introduced and delivered an address entitled "The Cinematograph as an Aid in Medical Education and Research, Illustrated with Moving Pictures of Ultramicroscopic Life and of Surgical Operations."

Dr. Charles A. L. Reed, Cincinnati, Ohio, followed with an address on "The Fee-Splitting Evil," which was discussed by Drs. Marcy, Hill, Dorsert, Mayo, and the discussion closed by Dr. Reed.

On motion of Dr. Marcy, a vote of thanks was extended to Dr. Reed for his very able and interesting address.

On motion, the Association adjourned until Thursday, 9 A.M.

THIRD DAY—*Thursday, December* 14, 1911

Morning Session.—The Association met at 9.30 A.M., and was called to order by the President.

32. "Remarks upon the Diagnosis and Treatment of Diseases of the Biliary Tract, with Special Reference to the Difficulties and Dangers," by Dr. Maurice H. Richardson, Boston.

Discussed by Drs. Mixter, Marcy, Ransohoff, Stone, Mayo, Vander Veer, Hill, and the discussion closed by the essayist.

Secretary Haggard announced that at the close of the morning session a luncheon would be given by the retiring President, Dr. Matas, to the President-elect, to which all members and guests were invited.

33 "The Treatment of Vesical and Diverticular Calculus," by Dr. Hugh H. Young, Baltimore, Maryland.

This paper was discussed by Drs. Bovée, Matas, Richardson, Hagner, Hunner, Martin.

34. "Lymphatic Edema; Elephantiasis Observations and Remarks," by Dr. Albert Vander Veer, Albany, New York.

Discussed by Dr. Matas, and the discussion closed by the essayist.

35. "Treatment of Pyelitis," by Dr. Guy Leroy Hunner, Baltimore.

36. "Additional Cases of Nephroureterectomy, with Remarks Relative to the Removal of Large Suppurating Kidneys," by Dr. George H. Noble, Atlanta, Georgia.

These two papers were discussed together by Drs. Fry, Young, Hunner, Hagner, and in closing by the essayists.

Secretary Haggard read telegrams from Drs. John D. S. Davis, J. E. Cannaday, William Polk, Herman Tuholske, Ernest Jonas, Edward J. Ill, William M. Perkins, John F. Oechsner, Howard A. Kelly, Reuben Peterson, and many others, regretting their inability to attend the meeting.

The Report of the Council was read as follows:

REPORT OF COUNCIL

1. That Dr. Ferdinand Herff, of San Antonio, Texas, one of the founders of the Association, one of the most prominent and able surgeons of his native State, and now at the advanced age of ninety-one, be transferred from the roster of Fellows to Honorary Membership.

2. That the resignation of Dr. George S. Brown, of Birmingham, be accepted.

3. That the deaths of our beloved Fellows, Drs. Joseph Price, William Warren Potter, Manning Simons, Herbert Nash, Alexander Hugh Ferguson, and J. B. Morgan, be appropriately memorialized.

4. That the above eight vacancies in the roster made by death and resignation be filled by the following applicants:

Dr. William C. Borden, Washington City; Dr. John T. Moore, Houston, Texas; Dr. T. P. Waring, Savannah, Georgia; Dr. Alexius McClannan, Baltimore; Dr. Henry Norris, Rutherfordton, North Carolina; Dr. Carroll W. Allen, New Orleans; Dr. Edgar P. Hogan, Birmingham, Alabama; Dr. Francis Reder, St. Louis, Missouri.

5. At the Twenty-fourth Annual Meeting of the Southern Surgical and Gynecological Association held in Washington City, December 12, 13, and 14, the following resolution was unanimously adopted:

The Southern Surgical and Gynecological Association being assembled in annual session desires to put itself on record as being earnestly in favor of the Owens bill, or any similar bill, providing for the establishment of a National Board of Health,

to be directed by a Cabinet official, to be known as a Secretary of Public Health, or the enactment into a Federal law any similar measures which would secure the extension and broadening of the scope of the existing medical and surgical work of the Public Health and Marine Hospital Service.

6. That the next annual meeting be held at Old Point Comfort, Virginia, and that Dr. Lomax Gwathmey be requested to act as Chairman of the Committee of Arrangements.

7. That the vacancy on the Council caused by the expiration of service of Dr. George Ben Johnston be filled by the retiring President, Dr. Rudolph Matas.

8. The following members are nominated for the offices of the Association:

President—Dr. J. M. T. Finney, Baltimore.

Vice-President—Dr. J. E. Thompson, Galveston, Texas, and Dr. W. P. Carr, Washington, D. C.

The offices of Secretary and Treasurer hold over.

All of which is respectfully submitted for action.

George Ben Johnston,
George H. Noble,
Stuart McGuire,
Bacon Saunders,
W. O. Roberts,
Rudolph Matas.

SECRETARY'S REPORT, 1911

To the Officers and Members of the Southern Surgical and Gynecological Association:

RECEIPTS

December 9, 1910—Balance in Bank	$ 337.81
December 21, 1910, to December 1, 1911—Dues received .	1850.00
December 1, 1911—Interest on deposit.	46.30
Total	$2234.11

DISBURSEMENTS

December 8, 1911—Check to Dr. W. S. Goldsmith, Treasurer	$2234.11
There remains uncollected from members	390.00

Those resigning during the year are: Ferdinand Herff and George Brown.

Deceased members during the year are: James B. Morgan, George R. Dean, Joseph Price, Manning Simons, Herbert N. Nash, William Warren Potter, and A. H. Ferguson.

Respectfully submitted,

W. D. HAGGARD,
Secretary.

On motion of Dr. Young, seconded by several members, the Report of the Council was adopted as read.

Dr. F. W. McRae, Dr. George F. Noble, and Dr. Stuart McGuire were appointed as a committee to escort the President-elect, Dr. Finney, to the platform.

The retiring President, Dr. Matas, in introducing his successor, said: It is quite evident that the selection of the Council has been in harmony and sympathy with all of the ideas of our Fellows in choosing our distinguished Fellow, Dr. Finney, as the next President of this Association, who is recognized as one of the ablest representatives of one of the institutions that has done so much toward the development of the best surgical ideas in this country—the Johns Hopkins University. While we all realize that Dr. Finney is an eminent surgeon, and is universally recognized as such, and is an able representative of this great lighthouse, we may say, of surgical knowledge, yet there is one thing above all these considerations we must remember, and that is Dr. Finney the man—a man who is deservedly popular and is one of the best loved men of the South.

In turning over this gavel and this office to Dr. Finney, we feel that the destinies of the Association will not only be safe in his hands, but will continue onward in a marvellous and magnificent manner, displaying a steady evolution forward, and I am very happy indeed to turn this (the gavel) over to you.

One other point; it gives me personal gratification to say whilst Baltimore is the city of his adoption, and he is a Baltimorean in scientific sentiment and in the surroundings of his intellectual atmosphere, he is nevertheless a genuine Mississippian, a State that has produced some of the greatest of American surgeons, among them Prentiss and Sanford E. Shelly. The whole ground seems to be consecrated, so that I feel I can shake hands with a neighbor.

Dr. Finney, in accepting the Presidency of the Association, said: Mr. President, my good neighbor, my good friend, I want to thank you first personally for the very kind words which you have said about me, but which I feel are so utterly undeserved. I wish I could feel that I really and truly deserve the compliment you have paid me.

Fellows of the Southern Surgical and Gynecological Association: I want to thank you from the bottom of my heart for this honor which you have done me. I think it is one of the highest honors that can come to any member of the profession. Certainly, I appreciate it more than I can tell you. At this moment I cannot find words adequately to express my feelings. I can only say to you, I thank you, and I sincerely hope I shall be able in some small measure to keep up the traditions and to live up to the high mark that has been set by my predecessors. This, gentlemen, is a presidency which I can accept without question.

Drs. Hunner and Sherrill were appointed as a committee to escort the newly elected Vice-Presidents, Dr. James E. Thompson and Dr. W. P. Carr, to the platform.

Dr. Matas: There is one thing I forgot to tell Dr. Finney; it passed my mind. I wish to say to Dr. Finney and his associates that in the course of the twelve months' work that is to follow, if they shall find their road made as easy for them as mine was for me by the collaboration of my distinguished associates and our efficient Secretary, Dr. Haggard, their work will not be burdensome but a pleasure. Our Secretary relieved me of an immense amount of detail, and my work was much easier than I had expected. I again express to you my thanks, and I believe I voice the sentiments of the Fellows of the Association when I say that we cannot get along without Dr. Haggard, because he is the running power in the machine.

Dr. Haggard said: Mr. President and Gentlemen: You have indulged me very cordially. I appreciate it more than I can possibly tell you. My only one excuse for continuing to perpetuate the occupancy of this office is the very near and dear place that it has in my heart, and if in any way I have served you in joining hands to make this the greatest living surgical society in the world, I have done more than I thought I was possibly able to do. I appreciate very highly what you have said about me.

Dr. Le Grand Guerry, Chairman of the Auditing Committee, reported that the Auditing Committee had examined the books and accounts of both the Secretary and Treasurer and had found them correct, and the signatures of the members of the committee were affixed to the report.

On motion, the report was accepted.

Dr. Henry O. Marcy, of Boston, moved that a rising vote of thanks be extended to the retiring officers for the splendid and impartial manner in which they have discharged their duties.

Motion seconded and carried.

On motion, the Association adjourned until 2 P.M.

Afternoon Session.—The Association reassembled at 2 P.M., and was called to order by the President.

36. "Umbilical Tumors Containing Uterine Glands," by Dr. Thomas S. Cullen, Baltimore, Maryland.

This paper was discussed by Dr. Thompson, and in closing by Dr. Cullen.

Dr. Henry O. Marcy: I have heard with great sorrow that our friend, Dr. Kelly, of Baltimore, is very ill. I move you, Mr. President, that the Association tender him a vote of sympathetic remembrance, and that the President and Secretary be requested to communicate the same to him by telegram.

Motion seconded and carried.

37. "Emergency Operation for Cerebellar Tumor under Artificial Respiration," by Dr. Harvey Cushing, Baltimore, Maryland.

This paper was discussed by Drs. Carr, Royster, Frazer, (by invitation) and Matas.

38. "Interstitial Ectopic Pregnancy," by Dr. Charles R. Robins, Richmond, Virginia.

Discussed by Drs. Cullen, Matas, Royster, Hunner, Jordan, Noble, and Cullen.

39. "The Essential Factor for the Cure of Hernia in the Male," by Dr. Henry O. Marcy, Boston.

Discussed by Drs. Vaughan, Hunner, Vander Veer, Carr, Long, and the discussion closed by the essayist.

40. "A Review of a Series of Operations for All Forms of Appendicitis," by Dr. Edward G. Jones, Atlanta, Georgia.

This paper was discussed by Dr. Jordan, Carr, Hunner, and in closing by the essayist.

Dr. Robert S. Hill, Montgomery, Alabama: I move, Mr. President, that the thanks of the Association be extended to the local members for their very generous and kind attention to us; that the further thanks of the Association be extended to their wives for the attention they gave to the wives of the visiting physicians.

Motion seconded and carried.

As there was no further business to come before the meeting, on motion, the Association then adjourned *sine die.*

WILLIAM D. HAGGARD,
Secretary.

ADDRESS OF THE PRESIDENT

THE CINEMATOGRAPH AS AN AID TO MEDICAL EDUCATION AND RESEARCH

A LECTURE ILLUSTRATED BY MOVING PICTURES OF ULTRAMICROSCOPIC LIFE IN THE BLOOD AND TISSUES, AND OF SURGICAL OPERATIONS

By Rudolph Matas, M.D.
New Orleans

In selecting the cinematograph as an aid to medical education and research as the subject for this address, I have been prompted by several considerations, chief among which is the desire that this official duty, which devolves upon me as your presiding officer, shall not fall too heavily upon you in the midst of your arduous and exhausting labors.

In choosing this subject, I have been inspired by the example set by one of my distinguished predecessors who, four years ago, charmed and delighted us by a most entertaining and instructive exhibition of the artistic treasures which he had accumulated in the course of a lifetime, largely devoted to the cult of art as applied to medicine and surgery. This lecture he made most effective by utilizing photographic reproductions of the great masterpieces of the pictorial art, which had been inspired or produced by the medical men

of all ages, either in elucidation of medical texts or of their procedures. After reviewing the modes of illustrating medical books, thoughts, and methods—and exhibiting the results obtained by use of the pencil, the brush, and the engraver's and etcher's tools—he laid stress upon the imperfections and poverty of medical illustrations which had characterized the production of medical books up to comparatively recent times. This crudity and glaring defect in the illustrator's art had been especially apparent in the medical book-making of this country, but we are now happy to testify that, thanks to Dr. Kelly's great enterprise, devotion, and personal sacrifice and stimulating influence, in surrounding himself with the highest order of artistic talent available abroad, this reflection and this complaint are no longer justified; for America can now safely pride herself in the most perfect and creditable illustrations that adorn the pages of medical books the world over. In closing this worthy address, Dr. Kelly called attention to the important part that photography and stereophotography had come to play in recording surgical operations and especially in familiarizing the student with the technique of surgery as exhibited by the most approved specialists. We all appreciate the immense value of the personal work that he has since done in behalf of surgical education, in this direction, by the publication of his well known *Stereoclinic.*

Without presuming to imitate Dr. Kelly, I have, however, sought in the same spirit, but with no claim to authority or special competence, to direct your attention and enlist your sympathetic interest—as teachers and skilled technicians—in the value and availability of another method of photographic reproduction, which, I believe, far surpasses all others in inherent interest, educational value, and in its immense though undeveloped possibilities for the scientific and technical training of the men of our craft.

It is in this special sense that I now wish to speak to you of chronophotography—or what is more familiarly known

as the moving picture process—and of the moving picture machines which, under various names, are in evidence all over the world. For the living or motion picture machine, whether it be called the "cinematograph" (Lumière) (from *kinema*, movement—derived from *kinein*, to move), "kinetograph," "kinetoscope" (Edison), "photocinegraph," "heliocinegraph," "cinegraphoscope," "eventoscope," "kinebleposcope," "photopolygraph," "photocinematograph," "movementoscope," "badizoscope," "pentamimograph," "biograph," or by any other patented name attached to "graph" or "scope," and, added to classical and nondescript roots, is, in its fundamental principles, based upon the methods of chronophotography. It is always an instrument which analyzes motion by means of a series of instantaneous photographs taken at very short and equal intervals of time, capable in its perfected forms of recording with equal fidelity and distinctness the objects that are placed before it; reproducing the halting gait of an ataxic, hemiplegic, or paraplegic patient or the vibrations of the wings of a fly, bee or wasp—which last scarcely $\frac{1}{100}$ of a second (Lucien Bull)—or the flight of a modern military projectile which requires consecutive serial exposure varying from a $\frac{1}{1000000}$ to $\frac{1}{10000000}$ of a second, or the record of 500 consecutive pictures within $\frac{1}{10}$ of a second. (Cranz, quoted by Gradenwitz, *Scientific American*, vol. ciii, p. 417.)

This is the machine which has become one of the most astounding and prodigious forces in the social organization of the twentieth century, in diffusing, imparting, and disseminating knowledge, as well as in providing diversion, recreation, and amusement to the countless multitudes of the civilized world. Though originally devised by purely scientific men, for the accurate observation and recording of natural phenomena, chronophotography has been perfected and developed into most amazing effectiveness by inventors and physicists who, intent upon utilitarian and financial returns, have concentrated their efforts in perfecting

the apparatus as a means of popular diversion. In this way great private concerns and companies have been organized all over the civilized world, whose chief if not sole aim has been to exploit this new photographic magic in every direction that might yield the largest pecuniary returns. The efforts of the earlier industrial pioneers met with an immediate response; success everywhere crowned their efforts, because everywhere we find men, hungry for the reproduction of lifelike scenes and stirring actions which arouse the emotions that lie awake or dormant in every human breast. In this way chronophotography has grown up in the course of a decade, from a mere rudimentary and shapeless idea, into a titanic Colossus which is now striving for power, as an indispensable world force, with the great world industries, even now scarcely second in importance to the great inventions like telegraphy, telephony, phonography, and the printing press, with which it is so closely allied in the dissemination of human intelligence and in preserving with all their vividness and intensity the daily, nay, the hourly events of the world's history.

Without stepping beyond the boundaries of our own country, we learn (*Moving Picture World,* 1910, vol. vii, p 183) that there were in 1910 about 10,000 or 12,000 moving picture theatres, and other places of amusement which use the moving pictures, in the United States. The population of this country is about 90,000,000 and if you divide 90,000,000 by 10,000 we arrive at the deduction that there is one moving picture house for every 9000 of the population. Again we are told (*Moving Picture World,* 1910, vol. vi, p. 128) that twenty new productions go out every week to the 12,000 biograph theatres in the United States, spread over 1,500,000 feet of film, and that 5,000,000 of people are estimated to be in daily attendance at these picture shows.

E. Palmer Lewis, in the *Survey,* wrote two years ago, "In New York City alone there are some 350 motion picture theatres, with daily audiences of 1,000,000 or more, and a

Sunday attendance of 500,000. Chicago entertains daily some 200,000 people in its 345 picture shows, and Philadelphia's 158 nickelodeons claim audiences of 150,000 every day of the week."

Replies to letters sent out by Lewis to the principal cities of the country, combined with statistics compiled by *Insurance Engineering* for April, show that in 158 leading cities of this country there were, in 1909, 1,987,000 moving picture exhibitions. A statement of the number who attended all these exhibitions would be a mere guess, but 4,000,000 a day is a conservative estimate, which would be far exceeded probably doubled by a calculation based upon the statistics of the present time.

Two-thirds of the entire theatre going public is entertained by this "infant industry" with its $50,000,000 of invested capital and its 190 miles of films daily thrown upon the screens of 7000 nickelodeons—this in round, bare figures is the estimate of the new amusement that has sprung up within a decade and become popular only within four or five years."

What has been said of the moving picture movement in this country might be repeated, with even greater emphasis, of the progress of the moving picture in Great Britain and her colonial possessions and of all continental Europe, especially of France, Germany, Italy, Austria, and Spain, as well as of other Mediterranean countries, peopled with an emotional and pleasure loving population, who have greeted the advent of the moving picture show with eagerness and enthusiasm as an economic means of satisfying the imperative and universal craving for excitement and amusement.

But to furnish amusement and recreation is not the only feature of the cinematographic machine. The signs of the times all point to the belief that the great captains of this industry are beginning to realize that there are other equally profitable fields in which to invest the immense capital

which this source of amusement alone has yielded. Suggestions are being offered and experiments are being tried of all kinds, proving that, in addition to an immense sphere of strictly scientific usefulness, the picture machine will ultimately revolutionize the present methods of general education and training in the technical and industrial, as well as in the public schools. It does not require a prophet's vision to see that in less than fifty years from now, children in our schools will be taught history with moving pictures as a principal guide. The Champagne riots which recently made all France tremble were photographed by the motion picture camera. The riots, to become a matter of history, have been saved for the future by this means, and we have the true record of the events as they really took place. The same is true of the late pictorial record of the imposing coronation of the British sovreigns, and of the recent scrimmage of the insurgents and federals just across the Rio Grande in Mexico; of the Italo-Turkish conflict in Tripoli, and of the great revolution in the Celestial Empire, with its many battles, now laying the foundation for the Republic of China. These, and all historical events, are being portrayed with absolute fidelity on the spot, and will be accepted in future as the unchallenged witnesses, whose testimony must be the guide of future chroniclers and historians.

For geographical instruction, the cinematograph now sends its lines all over the earth. The eye of the camera makes pictures from Brazil to the Yukon, from China to the Cape, from the Cape to Cairo. "It has become the teacher of the public mind, the organ of public opinion, the university of the common people."

In medical, surgical, and natural science—anthropology, botany, entomology, natural history generally—the motion pictures present wonders and facts scarcely possible of realization; while its illustrations of industrial life, technical processes and mechanical devices, are unique in their thoroughness and definition.

As an agent in imparting sanitary and hygienic knowledge of great importance to the masses, the cinematograph is playing a most effective part. For instance in impressing upon the public mind the dangers which lurk about the house fly as a transmitter of disease and of the importance of eradicating this pest, the moving picture is far superior to any lecturer's ability in its power to depict the peril.

"Pictures are made showing the fly invading a chunk of meat and laying its eggs. One sees these eggs hatching out and the maggots crawling over the meat. The maggots then bury themselves in the earth for a few days, and when they emerge, they are still wingless, but on the eleventh day they are grown flies. One sees them feasting on dead fish; then fly from there to the sugar bowl and deposit some of the microörganisms they have collected. Then the fly rests on the edge of a cuspidor, and from there to an infant's nursing bottle, and, as the film is finished, we see the baby suckling at his bottle, the nipple of which is covered with germs, unless it has been previously sterilized." (*Moving Picture World*, 1910, vol. vi, p. 375.)

Colonial governments have long recognized its usefulness in bringing to the very doors of the people at home, the importance, value and beauty of the British dependencies, not only as a means of inducing emigration, but of securing the introduction of fresh capital for further development and it is fairly common knowledge that there is a constant movement in the direction of securing fresh pictorial demonstrations of future possibilities for immigrant and investor in such countries as Australia, New Zealand, Canada, British Columbia, Argentine, etc.

In religious, missionary, social, and political work, the field of the cinematograph is equally great and important, both as a source of revenue and the conviction of usefulness and further effort instilled. For economical advertisement and public enlightenment it has no equal, and the benefit

to manufacturers has been out of all proportion to the cost, illustrating the scientific, industrial, and economical changes of the present day.

Various governments have already applied the kinematograph in naval and military affairs—gunnery, target practice, fleet movements, maneuvers—and before long every regiment and every warship will be equipped with a kinematograph for the acquisition and instructive display of pictures; indeed, to form a systematic course of education in training establishments afloat and ashore. (*Clegg, Moving Picture World,* 1910, vol. vi, p. 331.)

In the preceding remarks only brief mention has been made of the services accorded by the cinematograph to medicine and surgery, and it is this particular field of application that I now wish to consider more attentively.

While it is true that the cinematograph had its earliest beginnings in the minds of physicists such as Plateau (1829), Colman Sellers, Reville, du Hauron, and the astronomer Janssen, who in 1875 devised an astronomical revolver to show successive pictures of the planet Venus near the limb of the sun at her transit, we must not forget that among the greatest and most fundamental contributions to the science and methods of chronophotography were those made in the study of physiologic problems by Jules Etienne Marey, the eminent and indefatigable French physiologist. He devised a delicate photographic gun, which he utilized especially in the study of the flight of birds and in all the forms of locomotion, aquatic, aërial and terrestrial as exhibited by various animals and by man, and by his pupil Demeny who invented the photoscope for the special purpose of reproducing the motions of the lips and so successfully that deaf mutes were able to read the photographic sentences. As an instance of Marey's application of the cinematograph to physiological problems, in demonstrating muscular motions of the heart as an organ of the circulation

(J. E. Marey, *The History of Chronophotography;* Smithsonian Reports, 1901, Washington, D. C.), we quote: "The heart of an animal laid bare and brilliantly illuminated gives on the moving film the succession of systole and diastole of its auricles and ventricles. The motion of the eyes themselves were also shown at the Marey Institute by his pupil Orchansky. He has photographed the dotted trajectory of the eyes in reading and in this motion has been able to distinguish the components, due respectively to the ocular muscles and to the displacements of the head."

Even before Marey had begun his first researches on the flight of birds he had been preceded by the distinguished American investigator, Muybridge, a photographer of Sacramento, who in 1878 began his now famous studies on the motion of horses and other quadrupeds and man which formed the basis of his monumental work on *The Human Figure in Motion,* published in 1901 under the auspices of the University of Pennsylvania. As told in this great work, Muybridge, as the result of numberless experiments, in which he displayed an unequalled capacity for taking infinite pains in the pursuit of an idea, finally devised his "zoöpraxiscope," a machine based upon the principles laid down by the Belgian physicist Plateau in the early part of the last century, for the purpose of demonstrating the persistence of retinal impressions. Photographic analyses of changes incidental to motion of any kind commenced with this investigation, and the zoöpraxiscope was the first instrument ever constructed or devised for demonstrating by synthetical reconstruction, movements originally photographed from life, and for many years it was the only apparatus applicable to this purpose.

It was not until 1893, or more than thirteen years after it was first used, that any improvement in its construction, or in its effects on the screen, were made public.

The improvements in the modern instrument are due to the invention of celluloid films substituted for the glass plates in receiving and exhibiting the photographic images.

In 1878, Muybridge published under the general title, "*The Horse in Motion,*" the results of his labors. This was followed in 1881 by a quarto volume of some 200 pages of photographs illustrating various movements of horses, dogs, and other animals; also feats of the gymnasium and the field by some California athletes. This encouraged a more compehensive investigation. The funds were lacking, however, until the coöperation of the University of Pennsylvania was secured through Dr. William Pepper. The work was commenced in 1884 and completed in the autumn of 1885.

The results of this investigation, consisting of 781 mezzotint engravings with examples of more than 20,000 acts of motion of animals, birds and human beings, were in 1887 published in eleven folio volumes, under the title of *Animal Locomotion.*

The author's edition of this volume is valued at $2500. Muybridge used upward of 500,000 plates in his experiments. Wet plates were used and exposures of $\frac{1}{5000}$ of a second made. The odd pictures obtained were projected at a rate varying from 12 to 22 per second, by means of the zoöpraxiscope.

This colossal work is an imperishable contribution of chronophotography as applied to physical and physiological problems in locomotion, by an American genius.

The subsequent discoveries of Marey and his pupils, Lucien Bull and Demeny; of Auschütz, in Germany; of Augustus Le Prince, Jenkins, Costler, H. R. Heyl, all inventive Americans; of Levison, and especially the Lumière brothers; of Thos. A. Edison; of Cranz, and, very recently, of Comandon, assisted by the Pathé brothers—and of many others too numerous to recall—have culminated in the present most effective machine and its prodigious capacity for taking distinct instantaneous pictures in *incredibly short exposures.*

Among the medical men who deserve a conspicuous place in the history of the moving picture in its application

to the study of disease is Dr. Walter G. Chase, of Boston, Mass., whose pioneer efforts in this direction are recorded in a lecture delivered before the Boston Medical Library Association, November 15, 1905, and published in the *Boston Medical and Surgical Journal,* November 23, 1905. Interested in the study of pathological motion he availed himself of the services of the American Mutoscope and Biograph Company in analyzing the convulsive phenomena of the epileptic seizure. This is a difficult problem for the reason that it takes several minutes to set up and focus a biographic camera and the patient is not always sufficiently obliging to have his seizure out of doors in an available place and also at a time when the sun is at its best, for an outdoor light picture or a room with powerful electric lights especially arranged for the purpose. The only place available for this purpose is an epileptic colony, and in this he was fortunate in the coöperation of Dr. Spratling and his assistants at the Craig Colony for Epileptics. The method by which he obtained his pictures is interesting. "Realizing that it was imposible to set up a camera after the seizure had commenced he had some 125 male patients from the infirmary assembled at a convenient spot out of doors on a warm summer day. The clothes were removed and the patients covered with blankets, so that, a seizure occurring, the blanket could be readily dropped, and the subject within a very few seconds placed in the range of the camera. The results obtained as shown by the prints which accompany Dr. Chase's paper show that his painstaking efforts were eminently successful in "biographing" 21 separate seizures including one patient in the status epilepticus, all of which are shown with remarkable accuracy and vividness in the prints which accompany Dr. Chase's paper.

In the case of status epilepticus 200 feet of film were used, covering a total of 3200 pictures for this single case, which were obtained at the rate of 16 exposures to every foot of film. He has biographed in a similar way the movements

of the eyes in nystagmus and groups of rhythmic idiots, each with his individual motion keeping time with music. I agree with the editor of the *Boston Medical and Surgical Journal* in the belief that few physicians could see such a series of epileptic and other neuropathologic moving pictures as Dr. Chase has been able to reproduce, without learning something of the disease which neither his previous observations or his study of text-books have taught him.

"The more usual diseases of the nervous system also are still comparatively little known to the general practitioner of medicine and particularly the medical student or recent graduate. These may, and no doubt in the future will, be reproduced by the biograph in such a way that once seen by the student they will leave an impression hard to eradicate. In this respect Dr. Chase's admirable labors have already anticipated our own firm convictions that the universal adoption of cinematographic pictures as a means of instruction will mark a step far in advance of any yet taken in the application of photography to medicine. There can be no question that the hour is ripe for this innovation and that the immediate future will see its general introduction into our medical schools."

The moving picture machine has also been applied in France and Germany to analyze the gait of ataxic, paraplegic or hemiplegic, and other pathologic types of locomotion. Paul Sainton has also recently (*Soc. Neurol. Paris,* May, 1909) especially and profitably studied the convulsive tics, with moving pictures.

We have already referred to Bull's invention of the ultra-rapid cinematograph, by means of which sharp stereoscopic cinematographic views of the flight of a fly or the breaking of a soap bubble are readily obtained.

With the ordinary cinematograph the photographic film moves discontinuously, being arrested at the moment of each exposure. While this is simple enough at moderate

speeds, it would be quite impossible when the exposures are made at the rate of 2000 a second, and the mean speed of the film 400 cms. a second. These are the figures that are necessary for the study of insect flight, and these are attained by the new instrument. With such a speed, the movement of the film must be continuous and a sharp image is possible only if the exposure does not exceed $\frac{1}{400000}$ of a second, and for this the electric spark gives a light of sufficiently short duration. In order to study the movement represented on the films, it is merely necessary to pass them through the ordinary kinematograph, making some fifteen exposures a second, instead of the 1500 or 2000 a second employed in the taking of the photograph, and then the movements one hundred or more times as slow, will be seen, and, in many cases, easily followed.

By means of this very ingenious device, Bull has obtained admirable motion pictures of the flights of insects of all kinds, and has established thereby important biologic laws.

It is the same rapid spark device which has permitted Cranz and others to study the mechanism of the flight of projectiles, the working of self-loading arms, the effects of explosives of modern infantry high velocity projectiles in moist clay and in vessels filled with water; the crushing of bones; the explosive effects of such bullets on the skull, etc. All these different phenomena when reproduced on the projection screen seem to occur very slowly and accordingly can be analyzed in all their details.

Turning our attention to other fields, we find that Prof. Braus, Heidelberg, 1911, has demonstrated that the completely isolated embryonic turtle heart continues to beat alone, and to grow as well. I have already referred to Marey's earlier cinematograph records of the heart's movements. Going a step farther, P. H. Eijkman, a Dutch investigator, by combining the Röntgen ray and the cinematograph, has obtained remarkable pictures of the heart in motion. Kaestle and Rieder, coöperating with the

engineer Rosenthal, have been able to follow the movements of the stomach in digestion. They call this novel branch of chronophotography, "Bioröntgenography." Working on the same lines, we find that J. Carvallo, one of the investigators attached to the Marey Institute, at Paris, recently succeeded (1910) in illustrating by cinematographic *x*-ray pictures the process of digestion in warm and cold blooded animals. The animals under test were fed with a bismuth meal. Experimenting with the frog, the digestive tube of this batrachian was isolated and photographed with the cinematographic apparatus. A series of motion pictures were also taken through the fluoroscopic screen, and the two series, the simple and the *x*-ray image, were compared. It was found that both series corresponded. The external peristaltic movements caused by the progress of the bismuth bolus, agreeing with the radiographic view of the bolus as seen through the screen in the lumen of the bowel.

In this way, Carvallo's *x*-ray cinematographic pictures have succeeded in affording a reliable reproduction of the digestive process in the different species of animals placed under observation.

But undoubtedly the greatest triumph that has marked the recent advances of the new science of radiocinematography has been obtained by Comandon and Lomon, of Paris, who have succeeded in projecting and making perfectly practical the permanent *moving* reproduction of intensified fluoroscopic images of the skeleton and other organs of living animals, which thus far have been available only by ocular inspection or by single plate exposures. As described in their epochal paper in the *Presse Médicale*, May 27, 1911, No. 42, the results obtained by them with their earlier apparatus were first exhibited before the Society of Radiology of Paris last April. There was no difficulty in demonstrating the motion exhibited by such small animals as frogs, birds, and rats in their entirety. Their radiography is obtained with a rapidity of fourteen images per second. With exposures

of twelve images per second the cinematograph picture of the guinea-pig is obtained.

The skeleton of the entire animal is exhibited in all its moving details, even to such small items as the movements of the patella over the knee-joint. The thoracic cage moves hurriedly or slowly with the respiration. The heart distinctly pulsates in perfect outline. The liver is seen moving up and down with the diaphragm and is shown very clearly above the intestinal mass which is impregnated with the bismuth. The rectum is seen filling with the bismuth paste and then emptying itself of its contents.

In the monkey, the inner visceral life, which is invisible to our eyes by its impermeable integument, is revealed in a striking manner. Here the respiration, rhythmical and slow, as well as the movements of the heart may be readily followed. The stomach is well outlined and even the spleen is visible.

In studying the extremities, the flexion and extension as seen is profile, reveal in an astounding manner the mechanism of the condyles on the tibial planes. The movements of pronation and supination in the forearm and the flexion and extension of the wrist-joint may be studied in every detail and in a realistic manner. This is a revelation to the observer who is only acquainted with the isolated and plain image. These marvellous researches as stated by Comandon and Lomon, are barely crossing the threshold of practical application. The recent field of physiologic and anatomopathologic application is only beginning to unfold itself. It is in this sphere that lie some of the greatest unexplored possibilities for the perfected radiocinematograph and it is in this direction that further advances must soon be made.

"We are still in need of greater intensity of illumination for the reproduction of rapid phenomena; we are in need of screens that will give better definition; of tubes that will be more resistant, and of still more sensitive photographic emulsions."

"The day will soon come when these desiderata will be at hand and it will be possible to produce the mechanism of a dislocation or a fracture produced experimentally. As the matter now stands, the progress accomplished in the last twelve months in the graphic reproduction of mobile radioscopic phenomena is simply prodigious."

But the wonders of this new world of light and motion will not cease, and I still have another and more extraordinary achievement of the moving picture to submit, which you will admit is destined to prove of incalculable value in the teaching of microscopic pathology and especially in that ever growing science of hematology and hematic parasitology.

Marey, every alert for new applications of the graphic method in every department of medical science, had, in 1899, adapted the moving picture machine to a study of motions which take place in the field of the microscope; but it was reserved for the genius and enterprise of J. Comandon, then a young medical student attached to the laboratory of Prof. Dastre, of the Sorbonne, to advance a step farther and to utilize, in the most practical fashion, the cinematograph in the newly discovered field of ultramicroscopy.

All those who have worked with reflecting condensers for observing living bacteria under a dark background illumination, know how strikingly impressive are many of the preparations studied in this light. No doubt, many observers have regretted that they could not preserve these images, not only because of their almost fantastic and living beauty, but also for their great scientific interest. It was this thought that first led M. Comandon to photograph the ultramicroscopic forms that were the objects of his observation. But the ordinary instantaneous pictures failed to reproduce the *life* that was exhibited to the eyes of the observer, and more often the images were blurred by the constant motion of the microörganisms which displaced themselves from the focus. This prompted him to

INDEX TO PLATES

Radiocinematography: moving pictures of radiographic images of various parts of the skeleton in motion, illustrated on opposite page.

Radiocinematography illustrated by films obtained by M. M. Commandon and Lomon, Paris (reproduced by courtesy of Messrs. Pathé Frères).

Fig. 1.—Extension of the fingers combined with supination of the forearm (two images per second).

Fig. 2.—Extension of the elbow (two images per second).

Fig. 3.—Flexion of the knee-joint (two images per second).

Fig. 4.—Thorax and abdomen of a guinea-pig. The intestine filled with Bismuth paste is shown in active peristalsis with the bismuth bolus travelling rapidly along the intestinal canal (twelve images per second).

Fig. 5.—Thorax and abdomen of a monkey (ten images per second).

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Index to cinematographic films exhibiting ultramicroscopic objects in motion, shown by dark field illumination obtained by the method of M. J. Commandon (reproduced by courtesy of Messrs. Pathé Frères, Paris).

Fig. 1.—Human blood. The red and white corpuscles are shown in the living blood in motion.

Fig. 2.—The blood of oviparous animals. The blood of a bird has been reproduced in this film. The large oval erythrocytes of this species are shown. The nucleus of the red cell is not seen in this film, as this feature is not visible by oblique illumination; other films are issued which show the nuclei very plainly in altered blood undergoing hemolytic changes. The blood of the frog and salamander is especially suited for this demonstration on account of the large size of the corpuscles. In this film the interesting phenomenon of agglutination of the red corpuscles in radiating groups with a smaller leukocyte as a centre is well shown.

Fig. 3.—Hemokonia, or blood dust. These are particles of fat averaging 1 micron in diameter. They are seen agitated in lively fashion by Brownian movements. They are present in the blood in proportion to the amount of fat ingested. The blood of suckling animals at the breast is especially favorable for this demonstration.

Fig. 4.—The ameboid movements of a leukocyte are illustrated in this film. This preparation has been made and obtained from the living blood of a salamander. It shows in a striking and almost diagrammatic manner how the pseudopods or protoplasmic prolongations of the leukocyte are formed.

Fig. 5.—Trypanosoma Lewisi. A parasite found in the blood of sewer rats. In Paris, one out of five rats are affected with this disease. It is only fatal in very young animals. In the fatal forms of the disease the blood is infested with great numbers of these parasites, infinitely more numerous than the blood cells themselves. The film as reproduced gives no idea of the immense number and activity of these trypanosomes as they are revealed by the picture projected on the screen.

Fig. 6.—Trypanosoma Brucei. This film is introduced by a picture of the formidable tsétsé fly (Glossina palpalis), which is the cause of the fatal nagana—a disease which destroys whole herds of cattle and horses in South Africa. The film exhibits the blood of a rat inoculated with the nagana parasite or Lewis' trypanosome. The rat usually succumbs to an experimental inoculation at the end of four or five days. The picture of the blood infected with this horde of countless myriads of parasites is startling and imposing to the observer who sees the progress of the parasitic invasion on the screen.

Fig. 7.—Agglutination of the Spirochæta gallinarum analogous to the Widal reaction in typhoid fever. The blood of a fowl infected with chicken cholera treated with the serum of an animal immunized against the spirochæta.

Fig. 8.—Recurrent fever. This film when magnified on the screen shows the Spirochæta Obermeierei in action. The Russian type of recurrent fever is transmitted by the bed-bug. The African type, caused by the Spirochæta Duttoni, is inoculated by a tick (tick-fever). The reproduction of the film here given fails to show the parasite except on very close examination with a lens. On the screen these scarcely visible forms are projected with great vividness and effectiveness, and their biological characteristics are brought out in a manner that is startling even to those who are familiar with the usual methods of microscopic demonstration.

Fig. 9.—Spirochæta pallida or Treponema pallida, discovered by Schaudin, 1905. The specific organism of syphilis. This film is introduced by the exhibition of a laboratory inoculation of a rabbit's cornea followed by sections of the ulcer showing pure culture of this remarkable parasite in great numbers and in their fullest activity. In another film the cure of the lesion by the destruction of the parasites after the injection of the Ehrlich-Hata "606" is shown with wonderful detail and effectiveness.

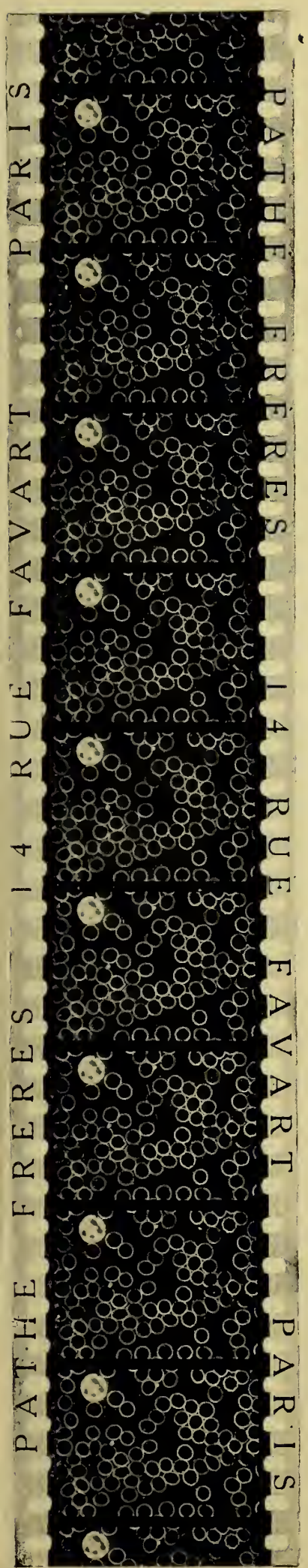

Fig. 1.—Human blood in motion.

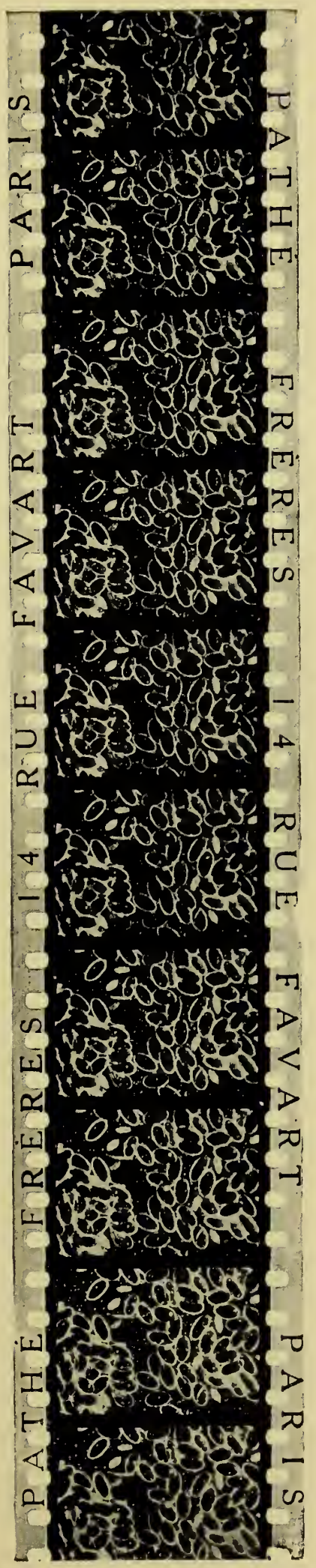

Fig. 2.—Blood of oviparous animals.

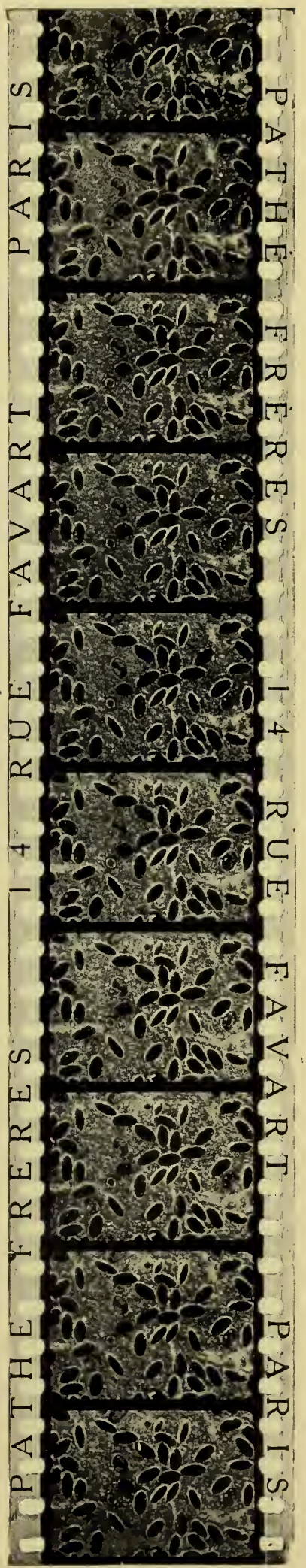

Fig. 3.—Hemokonia, or blood dust (emulsified fat in the circulation).

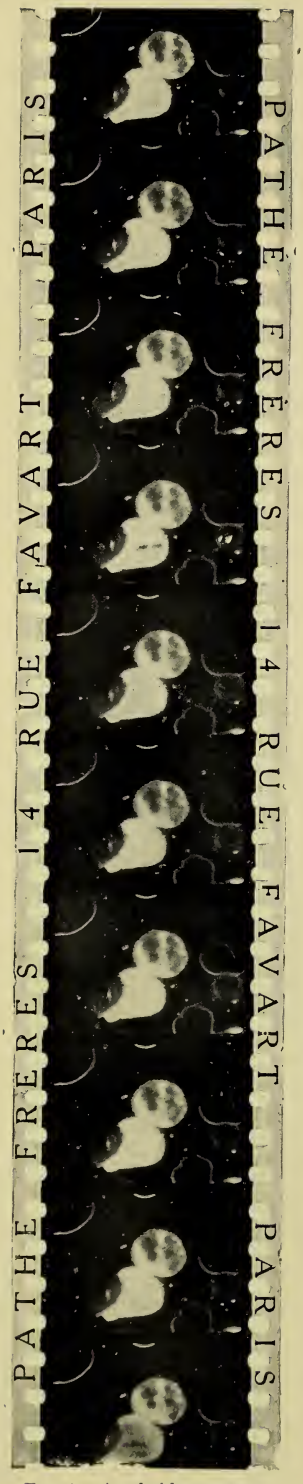

FIG. 4.—Ameboid movements of a leukocyte (blood of a salamander).

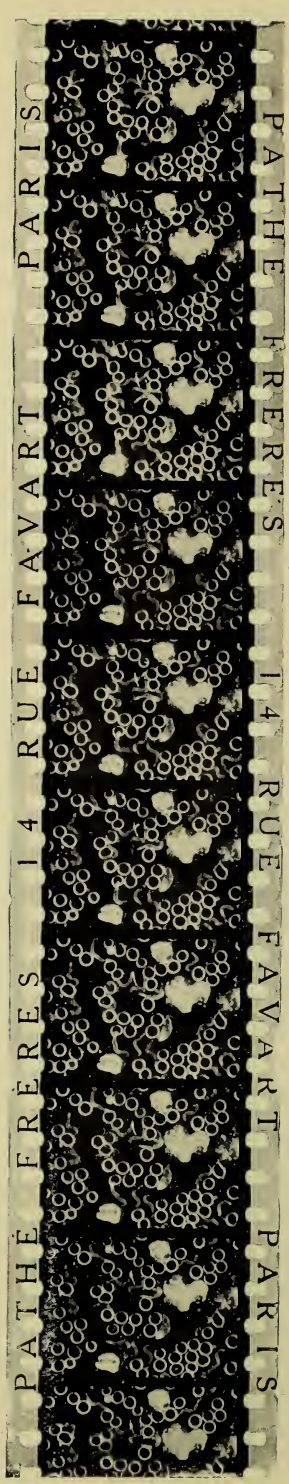

FIG. 5.—Trypanosoma Lewisi. The blood of a sewer rat infested with these parasites.

FIG. 6.—Trypanosoma Brucei, the cause of the nagana disease in South Africa.

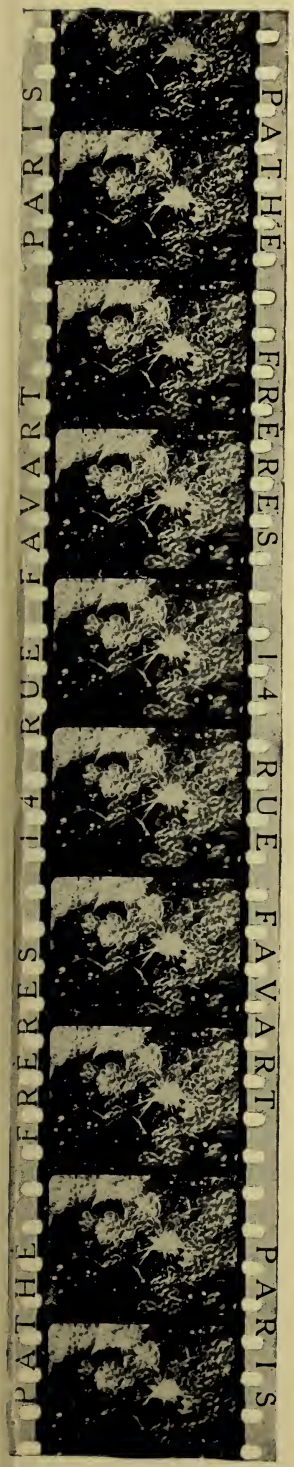

Fig. 7.—Agglutination of the Spirochæta gallinarum, analogous to the Widal reaction in typhoid fever.

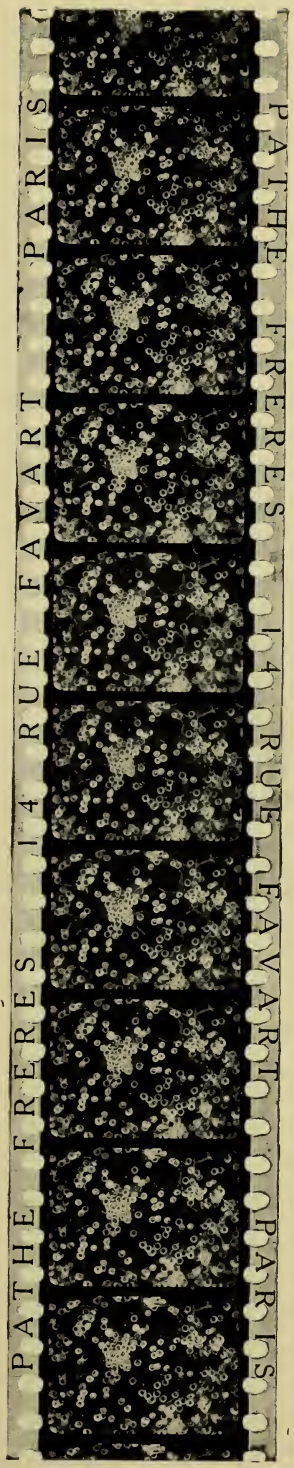

Fig. 8.—Spirochæta Obermeierei in the blood of patient suffering with recurrent fever.

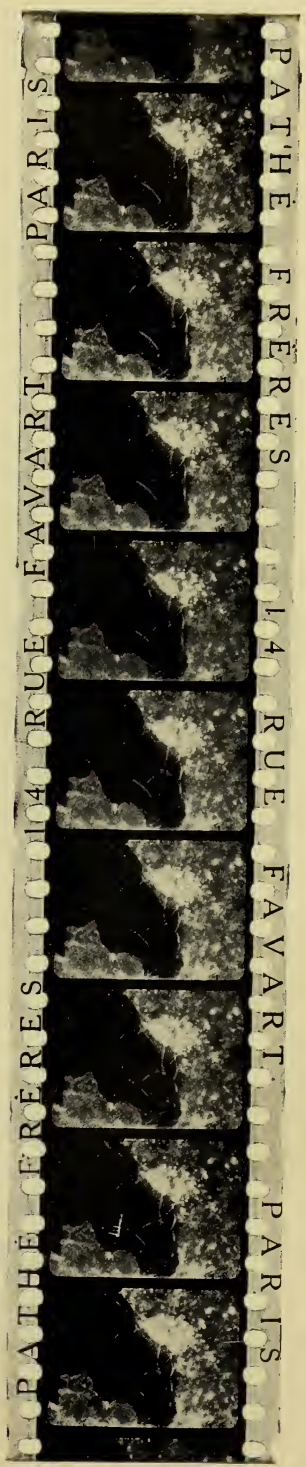

Fig. 9.—Spirochæta or Treponema pallida, the parasite of syphilis.

follow in the footsteps of one of his collaborators and teachers, M. Victor Henri, who, in 1908, had already attempted to apply the cinematograph to the study of Brownian movements. Finding the appliances thus far devised for this purpose absolutely unsatisfactory, he obtained the assistance and coöperation of M. Chas. Pathé, of Pathé frères, who placed at his disposal the vast mechanical and scientific resources of his great establishment. By utilizing the parabolic condenser of Liedentopf, constructed by Zeiss, illuminating the field with a powerful 30 ampère arc light (or the sunlight reflected by a heliostat) and adapting the cinematographic camera to a prolongation of the microscope, he was able to reproduce all the images visible in the dark field with a medium amplification. The views thus obtained, as projected on the screen, appear quite large; the human red cells being magnified so that they measure 15.3 cm. in diameter without being blurred, a result which equals an amplification of over 20,000 to 30,000 diameters. The images are reproduced by the cinematograph at the ordinary rate of sixteen pictures per second, which is equivalent to an exposure of $\frac{1}{32}$ of a second for each image. Projected on the screen at the same speed, these images reproduce the real aspect of the preparations. In this way are seen with all their living qualities, the movements of the various elements of the blood, the different parasites which infest it, and their Brownian movements as observed in particles of less than 1μ in diameter.

These moving films are, therefore, permanent documents which faithfully reproduce the scenes of ultramicroscopic life and are, in their very nature, as *living* phenomena, not, like dead, fixed and stained preparations, extremely changeable and of short duration. By analyzing each one of the images thus obtained, the movements of the micro-organisms may be decomposed and reduced to their primitive elements, just as Marey successfully analyzed the step of man and the flight of birds.

These views also allow an accurate count of many formed elements which it would be impossible to numerate owing to their motility. For example, the little movable particles of the blood which Hayem and Ranvier had studied long ago, and which were subsequently named "hemokonies," or hemokonia (blood dust) by Müller, have been recently studied with great care by Alfred Neumann, of Vienna, who has ascertained that they are simply minute fat particles. Their appearance in the blood is proportional to the amount of fat ingested and emulsified in the alimentary canal. Neumann was not able to count them accurately because of their very active Brownian movements. Comandon, with his cinematographic films, experienced no difficulty, and thus obtained numerical tables and charts which clearly demonstrated their direct relation to the amount of fat ingested by the subject under observation. The hemokonic count, thanks to the cinematograph, may now be made available as an index of fat absorption.

In addition, Comandon has been able to study, by this method, a phenomenon which he first discovered and described as an "electric transport of microörganisms and living particles." He found that if an electric current is made to cross the field of observation, certain elements of the blood are attracted and drawn to the anode and others to the cathode, thus grouping the various elements into electro-negative and electro-positive classes. Thus, the red cells are always attracted by the anode and the trypanosomes by the cathode. The typhoid bacillus moves toward the cathode; some of the colon bacilli move toward the anode. It does not matter how the organisms may be grouped or mixed on the slide, they will always preserve their special or specific affinities. Some microörganisms appear to hesitate and refuse to travel to either pole and become possessed of disorderly movements which last as long as the current is transmitted through the medium in which they live.

Thus we conclude that through M. Comandon's beauti-

ful researches we are not only able to penetrate into the intimate life of the living blood and its parasitic inhabitants, but also to study the processes of reaction and defence (inflammation, migration, diapedesis, phagocytosis, etc.) as they are exhibited in the bloodvessels and in the perivascular tissues.

In this way, the cinematograph is unrivalled for permanent record and observation, as well as for the most impressive instruction to students in general and surgical pathology, etc. Comandon has, furthermore, added another original observation which may prove of decided utility in identifying some cells and organisms by their electric attraction and repulsion.

In the views that will be successively projected on the screen you will see the coagulation of the blood, the blood of man, of the birds; the hemokonia or fat bodies of Müller; the ameboid movements of the leukocytes; phagocytosis, as this occurs in anthrax; you will see the flora and fauna of the intestines of the mouse; the Trypanosoma Lewisi in the blood of a sewer rat; the Trypanosoma Brucei as transmitted by the tsetse-fly; the spirilla of relapsing fever (Obermeierei); the spirocheta of Vincent; the Treponema pallida as it lives in syphilitic lesions; the agglutination of the bacillus of Eberth, as seen in the Widal test, and, finally, the demonstration of the Erlich-Hata "606" as it affects the parasites in an experimental lesion in the cornea of a rabbit.

These films have been selected chiefly in view of demonstrating the value of cinematography in teaching ultramicroscopic pathology in the class room. Here you will see the *life* that no other form of photographic process could reproduce.

"To see the microörganisms move, evolve, and revolve in the midst of normal cells, the spirochetæ uncoil and undulate in the fluids which they inhabit, to see them hide

behind the blood corpuscles, or in clumps of fibrin, turn, twist, and rotate inside of a red corpuscle as if in a cage—to see them apparently screw into each other as in a strange conjugation; to see trypanosomes moving back and forth in every direction, displaying their delicate undulating membrane, shoving aside the blood cells that are in their way, while by their side the leukocytes lazily extend or retract their protoplasmic pseudopods—is to realize that we are in the presence of an unknown world, a world of the infinitesimally small, but a world as real and as complex as that which is visible to our eyes."

But dismissing these more scientific applications of the cinematograph as they especially concern the laboratory teacher, let us consider for a few moments, examples of its application as an educational agent in the proper training of the mechanic and artisan in the trades which require intelligence and manual dexterity, and which hint at its possibilities in the teaching of surgical operations and the proper handling of surgical tools.

A writer in the *Scientific American* (supplement, 1909, vol. lxvii, p. 76) states: "The moving picture machine offers a partial solution of the problem of imparting individual instruction in the trades. Next to actually doing the thing, or seeing a skilled workman do it, is the seeing of it done in a series of moving pictures.

"For example, take the operation of accurately fitting a flat surface on a piece of cast iron held in a vise; a series of pictures showing the correct position and manner of handling the file could not help making a strong impression on earnest learners of the machinist's trade. The same method would apply to the operation of chipping with the hammer and chisel, scraping, lapping, laying out, and many other hand operations, almost impossible of complete description without working examples.

"In machine work the moving picture scheme could be employed with even greater success. The operation of chinking a casting on the face plate of a lathe, and bowing and facing, could be shown vividly. Dozens of other operations shown in this way could be repeated indefinitely for the instruction of countless numbers of young men. They would be impressed by the methods illustrated and the spirit in which a skilled workman proceeds in doing the things portrayed."

The first investment for films illustrating shop operations would be heavy and the plan must be worked out coöperatively in order that manufacturers may avail themselves of this system of imparting apprenticeship instruction cheaply.

In our opinion there is much in this idea as a feature in a general scheme of industrial education.

From this brief statement of the application of the cinematograph to the manual training of the artisan, we gather not only a valuable example but also suggestion, which I hope will not fall on sterile soil in a gathering of surgical specialists who are preëminently recognized as the foremost in availing themselves of every opportunity to improve the technical efficiency of their profession.

Here we see formulated a plan by which any mechanical trade requiring manual training and skill in its exercise, is to be taught by the living vitalized image of the expert and master mechanic at work. Not only is the student able to see the work done in every minute detail, but he will also see the performance carried out as it should be and is done by a chosen expert in that particular procedure or maneuver.

Why could we not profit by this suggestion and inaugurate cinematographic courses that would illustrate all the operations of surgery covering a complete course of operative surgery as contributed by the most noted and greatest specialists in the surgical profession? Dr. Kelly has not

only grasped this idea but has put it into execution in his admirable stereoclinics, but, I dare say, he would be the first to admit that, notwithstanding the recognized value of the stereoscopic photograph, this has its decided limitations, as it can only be seen and studied by the individual who is holding the image before him and that it is not applicable to class demonstrations where groups of students may simultaneously witness an operation with all the vividness and intense realism of the moving picture. Furthermore, the moving picture not only shows every detail that the small stereopticon can reveal, but it follows every movement and expression of the operator, his assistants, and the patient as they are projected, magnified to normal size, on the screen. Who could gainsay the enormous advantage to the medical students of this country if they could be given the privilege of witnessing, in their own lecture rooms, the scenes and accomplishments which are enacted by the great masters of American surgery in Rochester, Baltimore, Chicago, Boston, New York, and Philadelphia and other places; to see each and every one of the classical operations of surgery performed by a recognized authority in that particular operation?

It is to the credit of Dr. E. Doyen, of Paris, that he has not only organized this method of observation and instruction over fifteen years ago, but that he has devised special ingenious machines by which accurate and artistic reproductions of all the operations performed in his institute in the rue Picini could be permanently preserved. He has utilized his vast collection at great cost not only in illustrating his remarkable treatise on surgery (*Therapeutique Chirurgicale,* in six volumes, 8vo, Maloine, Paris), but is publishing a special course of operative surgery as a text to accompany a corresponding series of cinematographic films which are now issued by the Eclipse Company, of Paris. It is his intention to utilize not only monotints, but to reproduce his operations in colors, much in the same manner and by

a similar process as that adopted by his color photographer, the well-known M. Courtellemont, in his excellent polychrome plates which are now appearing serially in the Annales de Doyen.

Merely to show what has been accomplished by the cinematograph in recording surgical operations, I shall project upon the screen several of the Doyen films, which I obtained from the Eclipse Company while in Paris last summer. I regret that none of the color films were available, but these will suffice to show what can be done with an ordinary instantaneous film and I trust it will be sufficiently satisfactory and impressive to encourage the belief that it will not be long before our own enterprising teachers and operators, on this side of the Atlantic, will adopt this method of recording their most typical operations. It is evident that the outlay would at the start be considerable, but in every great university or teaching centre the services of a competent photographer especially qualified for cinematographic work should be available. Some of this work could be done by individual initiative. The prospect of the expense is not so alarming when we consider that the cost of an outfit has been very much reduced both in France, by improvements made by the Pathé Brothers, and in this country by the efforts of the Edison Kinetoscope Company. In a recent letter (November 28) kindly referred to me by Dr. Le Conte, of Philadelphia, the Edison Company announces that it expects to have very shortly a Home Kinetoscope which is both a motion picture and stereopticon apparatus, projecting pictures of different sizes. A notable feature of this machine is that it uses a film which contains three rows of pictures which enables the operator to exhibit on barely 80 feet of film the equivalent of 1000 feet of the regular professional film. As the new film will sell for fifteen cents per foot, making the cost of the 80 foot film twelve dollars, as against approximately one hundred, or the equivalent in professional films, you will realize that the

cost has been greatly reduced and the kinetoscope made much more available to the general public. This new instrument will, it is announced, be listed at about fifty dollars, making it comparatively cheap and also available to the individual teacher.

The purpose of the company in issuing these new machines and films is to make them especially useful and available for educational work in schools, churches, and all kinds of organizations. By this means we see the time rapidly approaching when the surgical specialist or teacher of surgery may keep a cinematographic record of his own operations and thus establish the basis of a mutually coöperative and interchangeable cinematographic surgical clinic in which all the interested workers can participate.

Bibliography.

1. Henry S. Atkins, 1910. (Motion Pictures in the Treatment of Insanity.) Moving Picture World, vi, 1092.

2. G. Babin, 1908. Making of Moving Pictures. Scient. Amer., Suppl., lxvi, 24–26; 40–42.

3. Thomas Bedding, 1910. (Two Processes of Natural Colors in Moving Pictures.) Moving Picture World, vii, 804.

4. J. Boyer, 1910. Moving Pictures of the Flight of Insects, Scient. Amer., ciii, 84–85.

5. V. Boys, 1910. Ultra-rapid Kinematograph. Nature, London, lxxxiv, 112–113.

6. Braus, 1911. Nervenspannung. Vossische Ztg., October 20, Abend Ztg., Beilage. Bericht des Naturforscher-Tages.

7. L. Bull, 1910. Travaux d. l'Assoc. de l'Inst., Marey ii, 51–75, Paris. Carvallo, 1910. Travaux de l'Assoc. de l'Inst. Marey, ii, 44, Paris.

8. A. Chacon, 1908–09. El cinematograf. y la higiene de la vista. An. de oftal., México, xi, 363–368.

9. F. M. Chapman, 1909. Bird Motion by Cinematograph. Collier's, March 13, xlii, 20.

10. Walter G. Chase, 1905. The Use of the Biograph in Medicine, Boston Med. and Surg. Jour., November 23, cliii, No. 21, 571, 572, 594.

11. Thomas Clegg, 1910. (Influence of Moving Pictures), Moving Picture World, vi, 331.

12. Comandon and Lomon, 1911. La radiocinématographie par la photographie de l'écran renforcateur, Presse méd., Paris, xix, No. 42, 27 mai, 493.

13. Friedrich Dessauer, 1910. (Moving Pictures of the Heart in Motion), Deutsche Revue, Stuttgart; abstract in Rev. of Reviews, 1910, 242.

14. William Kennedy Laurie Dickson, 1895. History of the Kinematograph, Kinetoscope, and Kinetograph, 55 pages.

15. M. P. Eykmann, 1908. Sur la cinématographie avec les rayons *X*, Arch. d. électr. méd., September 23, xvi, 741–742; also Revue Lux de Hollande, October, 1908; J. de radiol, November, 1908.

16. A. Gradenwitz, 1905. Improved Methods in High Speed Chronophotography, Scient. Amer., July 15, xciii, 50–51.

17. ———, 1910. Novel System of *X*-ray Cinematography, Scient. Amer., September 24, ciii, 243.

18. ———, 1910. Photographing the Flight of Projectiles, Scient. Amer., ciii, No. 26, 417.

19. Henry, 1911. (Teaching of History in the Schools with Motion Pictures), Moving Picture World, viii, No. 27, 1565.

20. Charles F. Jenkins, 1897. Picture Ribbons; an Exposition of the Methods and Apparatus Employed in the Manufacture of the Picture Ribbons, 56 pages, Washington.

21. ———, 1898. Animated Pictures; an Exposition of the Historical Development of Chronophotography, 118 pages, Washington.

22. ———, 1908. Handbook for Motion Pictures and Stereopticon Operators, 132 pages, Washington, D. C.

23. C. Kaestle, H. Rieder, and J. Rosenthal, 1909. Ueber kinematographisch aufgenommene Röntgenogramme (Bioröntgenographie) der inneren Organe des Menschen; München. med. Wchnschr., lvi, l, No. 6, 280–282.

24. ———, 1909. Radiographie cinématographique des organes internes (bio-röntgenographie, abstract, Arch. d. electr. méd., Paris, xvii, 700–701.

25. ———, 1910. Ueber Röntgenkinematographie (Bio-röntgenographie) innerer Organe des Menschen. (2 Mittheilung), Ztschr. f. Röntg. u. Radiumforsch., Leipzig, January, xii, Heft 1, 1–15.

26. ———, 1910. Bioröntgenography (abstract), Moving Picture World, vii, 747.

27. ———, 1911. La radiocinématographie (bioröntgenographie) des organes internes (abstract), Arch. d'élect. méd., Bordeaux, xix, 81–86, Figs. 1 to 26.

28. Levaditi, Comandon, Mutermilch, 1910. Mécanisme et reproduction cinématographique du phénomène be la phagocytose, Presse méd., Paris, 30 juillet, No. 56, 544.

29. Lomon, 1910. Bull. et mém. Soc. de radiol., 10 mai, 173; 14 juin, 199; 12 juillet, 222.

30. Etienne Jules Marey, 1898. Compt. rend. Acad. d. sc., Paris, 23 mai, cxvi.

31. ———, 1898. La chronophotographie applique á l'étude des actes musculaires dans la locomotion, 12 pages, Paris.

32. Etienne, Jules Marey, 1901. History of Chronophotography, Smithsonian Report, Washington (1900), 317–340.

33. McConahey, 1911. (Moving Pictures of Engineering Feats), Moving Picture World, September 16, ix.

34. Edward Muybridge, 1901. The Human Figure in Motion, 277 pages, London.

35. L. E. Palmer, 1909. World in Motion, Survey, June 5, xxii, 355–365.

36. Percival, 1910. (Soothing Influence of Motion Pictures on the Insane), Moving Picture World, vi, 376.

37. A. Pi y Suner, 1906. Sur l'inference perceptive du relief dans certaines cinématographies, Compt. rend. Soc. de biol., Paris, lx, 86–88.

38. Jean Ch. Roux and Balthazard, 1897. Sur l'emploi des rayons de Röntgen pour l'étude de la motricité stomacale, Compt. rend. Soc. de biol., Paris, S. 10, iv, 567–569.

39. ————, 1897. Étude des contractions de l'éstomac chez l'homme á l'aide des rayons de Röntgen, Compt. rend. Soc. de biol., Paris, n. s., iv, 785–787.

40. ————, 1898. Étude du fonctionnement moteur de l'éstomac á l'aide des rayons de röntgen; Arch. de physiol., Paris, s. 5, x, 85–94, 1 pl.

41. P. Sainton, 1909. Présentation d'images cinématographiques pouvant etre examinees á l'aide d'un apparat a main, Rev. neurol., Paris, xvii, 1432.

42. P. Schenk, 1909. Der Kinematograph vom hygienischen Standpunkt, Deutsche med. Ztg., Berlin, xxx, 629.

43. R. Stigler, 1908. Ueber das Flimern des Kinematographes, Arch. f. d. ges. Physiol., Bonn, cxxiii, 224–232.

44. R. Villers, 1911. (*X*-ray Moving Pictures), La Nature, Paris, 18 juillet.

45. ————, 1911. (*X*-ray Moving Pictures, abstract, Moving Picture World, ix, No. 10, 781.

46. Lyn Williams, 1908. Statistics of Moving Pictures, Moving Picture World, 27.

47. R. W. Wood, 1901. The Photography of Sound Waves and the Demonstration of the Evolutions or Reflected Wave Fronts with the Cinematograph, Ann. Report Smithsonian Inst., 1900, Washington, 359–370, Figs. 1 to 24.

48. Lyman L. Zarbaugh, 1911. Motion Pictures on the Care of Teeth; Moving Picture World, September 23, ix, No. 11, 883.

49. Waller P. Eaton. Education by Moving Pictures, Munsey's Magazine, January, 1912.

50. F. A. Talbot. Moving Pictures: How they are Made and Worked, 80 illustrations, J. B. Lippincott Co.

Unsigned Notes and Editorials.

51. 1909. Theatres Second only to Schools, Charities, March 6, xxi, 1038–1039.

52. 1909. Moving Pictures to Show Epilepsy, Charities, January 30, xxi, 737.

53. 1910. Moving Pictures and Health, Independent, March 17, lxviii, 591–593.

54. 1908. Startling Development of the Bi-dimensional Theatre, Current Literature, xliv, 546–549.

55. 1908. How Miracles are Performed in Moving Pictures, Current Literature, September 29, xlv, 328–329.

56. 1909. Animated Photographs in Natural Colors, Nature, London, January 14, lxxix, 314.

57. 1911. Motion Pictures, Outlook, June 23, xcviii, 381–383.

58. 1910. Moving Pictures of the Heart in Action, Rev. of Reviews, August, xlii, 243.

59. 1907. Biographical *X*-ray Pictures of Respiration, Scient. Amer. Suppl., November 2, lxiv, 285.

60. 1909. Moving Pictures in Natural Colors, Scient. Amer., May 15, c, 374.

61. 1909. Tricks of the Moving Picture Maker, Scient. Amer., June 26, c, 476–477.

62. 1909. Moving Pictures as an Aid to Teaching Trades, Scient. Amer. Suppl., January 30, lxvii, 76.

63. 1910. Cinematograph and its Development, Scient. Amer. Suppl., December 10, lxx, 374.

64. 1906. Moving Pictures of Growing Plants, World's Work, June, xii, 7690.

65. 1910. Theatre with a 5,000,000 Audience, World's Work, May, xx, 12876.

66. Moving Picture World, 1908, 82; 1910, vi, 21, 375, 1092; 1910, vii, 83, 291.

THE RESULTS OF LIGATION OF ONE URETER

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Those engaged in abdominal and pelvic surgery during the period of its development will recall the fear of an accidental ureter ligation, and those familiar with the earlier text-books on Gynecology are familiar with the dangers so graphically described as following this accident. It was firmly believed for a long time that such accidental ligation of one ureter was followed within a short time by the death of the patient and we will recall such statements expressed in medical societies as:

"To ligate a ureter is necessarily fatal." "Doubtless many cases go to the grave as a result of a ligated ureter;" and, "Were the causes of all our deaths actually known, ligation of a ureter would frequently be found to have produced many of them." These were the accepted opinions until eight or ten years ago when the pendulum swung the other way and it was for a time thought that the accident occurring unilaterally was followed by no bad effects whatsoever. Some six or seven years ago Dr. Robert T. Morris stated that ligation of one ureter was followed by absolutely no ill consequences, that the kidney ceased to functionate and underwent atrophy.

The statement emanates from one of the large surgical clinics in this country that in seven different cases one ureter had been intentionally ligated for the purpose of getting rid of the kidney, the patients each suffering from accidental injury of a ureter and consequent fistula. This statement bears out the generally accepted opinions today as to single ureter ligation, and it seems that we have been convinced that the result of this surgical accident is far from being a fatal one and that practically the only effect is the physiological loss of the kidney on the affected side.

Personally we have never so far as we know ligated a ureter during the course of an operation, so we can only speak from the experience gained as a result of our experimental work. Nor has the one of us engaged in pathological work ever seen this accident at the autopsy table, notwithstanding our work for some years past has given us ample opportunity for a large number of post-mortem examinations.

During the last summer, in connection with some other work we were doing in the pathological laboratory of the University of Louisville, we began a series of experiments to determine, if possible, what did actually take place as a result of the ligation of one ureter. The observations made were in many respects quite interesting and by no means uniform in regard either to the end result or the condition at any given time subsequent to our ligations. While our work is not completed it is sufficient to enable us to arrive at some definite conclusions and has gone far enough along to enable us to present some few facts at least.

The experimental work along this line heretofore has been largely from the metabolic side and has been carried out almost entirely upon guinea-pigs and rabbits. Our work has been from the clinical and pathological standpoint. In a study of the effects of ligation of one ureter upon the kidney and upon the animal, it has been shown by Amos, Bainbridge, and Beddard that the renal tubules continue to secrete urine and that Heidenhain's view as to the

functions of the kidney is, in all probability the correct one; their experiments decidedly indicate that the secretory activity of the tubules is rapidly impaired by ligature of the ureter, whereas the glomerili are more gradually involved. Even two months after ligature the kidney can still secrete some water and some nitrogenous material.

The rapid flow of urine occurring immediately after opening the ureter is doubtless analogous to that observed clinically under similar conditions. It can hardly be the result or increased secretory activity on the part of the kidney, since this organ subsequently yields much less urine than the normal kidney of the same animal. It may be suggested, as a conjecture, that the sudden alteration of pressure on the damaged glomerular epithelium allows purely physical factors to act unchecked and that the first rush of urine is formed by simple filtration through the glomerule.

Bainbridge concludes:

1. Ligation of one ureter is followed by hydronephrosis of the kidney.

2. There is a temporary loss of weight followed by complete recovery, no ill effects are noticeable two months after the ligature.

3. The initial pressure of the urine is low and bears no relation to the blood pressure.

4. The secretory power of the kidney, as evidenced by its capacity to secrete water and nitrogenous constituents, steadily diminishes after ligature of the ureter, but is not lost at the end of two months.

5. No absorption (that is, any evidence of it) was obtained when KI was put under a pressure of 50 to 80 mm. of Hg. into the renal pelvis.

Orth found following ligation there occurred dilatation of the tubules, flattening of the epithelium, and changes in Henle's loop. Immediately following ligation the pressure of urine upon the veins of the pelvis of the kidney brings about a state of hyperemia and hemorrhage, particularly

under the capsule and in the connective tissue. After two or three days anemia succeeds hyperemia and ultimately atrophy develops. The pressure of the stagnant urine in the ligated ureter and pelvis of the kidney causes an edema of the organ extending to the capsule and surrounding connective tissue. This edema is due to the reabsorption of the watery elements of the urine by the lymphatics and of course disappears when secretion ceases.

Lepine and Poeteret found by experiment that the secretion of urine ceases as soon as the counterpressure in pelvis of kidney amounts to 50 mm. of mercury.

Conheim showed that a 50 mm. Hg. pressure is necessary to arrest the flow of urine. When an obstruction takes place gradually, the walls of the ureter lose their tone, so that the largest hydronephrotic sacs are those brought on insiduously or experimentally which give the stagnant urine time to exercise mechanical dilatation of the walls, while with a sudden closure there is a distention of the kidney and ureter which very soon disappears. The stout elastic capsule of the kidney and the resorptive function of the lymphatics, are forces which contribute largely toward the reduction in size in these latter cases of sudden complete obstruction.

Straus found in his experiments, using twenty guinea-pigs, that four or five months after ligation there was a high-grade hydronephrosis with atrophy of kidney and disappearance of pyramids. Histological examination showed atrophy, collapse of tubules, shrinkage of epithelium, cystic widening of the Malphigian corpuscle and thickening of capsule and bloodvessels. There was compensatory hypertrophy to nearly double the size in the other kidney. Five of his experimental animals died of peritonitis.

We find a report of only one clinical case in the English literature, this being a translation from the German of Landau's case. Landau cites three operators, Bastionelli, Futh, and Phenomenow, who had carried out the procedure

which he reports, namely, ligation of the ureter for the relief of accidental urinary fistula. He says in his report:

"It is now seven months after the operation, and the patient has made a good recovery in spite of the fact that, for three days, she vomited and had a violent headache, and that the urine was lessened to half the amount for two weeks. Up to this time there have been no symptoms of hydronephrosis. The cystoscopic examination shows the right kidney to be functionless, the orifice of the right ureter appearing on the bladder wall as a small dimple."

Our experiments were carried out on dogs. The technique consisted of ligating the ureter with Pagenstecher yarn close to the bladder. The posterior layer of peritoneum is left intact if the ligation is done low down. Some of the earlier dogs were tied high up, but as this necessitated a search and division of the posterior parietal peritoneum, was abandoned after four or five applications. In tying low down no handling of intestines is required, and usually three to five minutes suffice to complete the entire operation. Dogs 2, 4, 5, 21 and 30 died as a result of operation. The others were destroyed in from two hours to two months after application of the ligature and not only were the symptoms studied during their life, but the postmortem condition was noted and in many bacteriological examinations were made of the urine in the pelvis of the kidney and in the bladder. Those dogs showing abscesses in the kidney were also studied in part from the bacteriologic standpoint showing a staphylococcus present as a constant finding. This organism was the only one found in the urine in those instances in which a bacterium was present.

The specimens from dogs 3, 8, 32, and 33, as seen in Figs. 1 to 4 show the different changes we have observed. Each specimen is shown with the normal kidney, namely, the kidney from the unligated side of the same dog.

In Experiment 22 we tried to simulate the happenings of an accidental ligation and division of a ureter during the

Fig. 1.—Experiment 3. Marked hydro-ureter; abscess of kidney; staphylococcus infection; kidney shown to right from unligated side.

Fig. 2.—Experiment 8. Enormous hydro-ureter; miliary abscess of kidney, particularly the cortex; kidney shown to right from unligated side.

Fig. 3. — Experiment 32. Enormous pyelonephrosis; kidney three inches in diameter; five inches in long axis.

Fig. 4.—Experiment 33. Hydro-ureter, atrophic kidney; compensatory hypertrophy shown in kidney to right, which is from the unligated side.

course of an operation, using, however, non-absorbable ligature for purposes of identification, and to enable us to surely relieve the constriction after one week. The results in this case are extremely interesting. Only a few of the animals appeared sick or at all affected, which is in keeping with what usually happens. However, it must be noted that in Experiments 3, 5, 8, 18, 31, and 32 abscess formation was noted in the kidneys. This is probably in keeping with the work of Brewer as shown in his chairmanship address before the Surgical Section of the American Medical Association. It is clearly demonstrated by him, we believe, and generally accepted, that kidney infections occur through the blood channels, the organ as a result of injury becoming a *locus minoris resistentiæ*, permitting bacterial lodgement and development. Ligation of or sudden obstruction of a ureter which is complete, even though existing for a few hours only, may do the same thing. When the obstruction exists as long as two or three days it may result in abscess formation, while if the absolute obstruction be continued, it may eventuate in a large pus kidney. Such a pyonephrosis is noted in 31 and 32, the latter being shown in Fig. 4. Experiment 31 presented an exactly similar condition of the kidney and also had present when destroyed a suppurating femur which had begun as a swelling about two weeks earlier, the swelling rupturing with purulent discharge a week later, *i. e.*, a week before destruction. This dog had an extensive osteomyelitis doubtless of embolic origin from the suppurating kidney. Animals 28 and 33 are still living and will be studied at a later date.

We think the edema in the perinephritic tissue is also worthy of note and believe with Orth, that the secreted urine is probably reabsorbed in this way, that is, through the lymph channels. Constant were the dilations of the peripheral veins—showing a very probable anastomosis of the renal vein with the adrenals and the intercostals. This is noted in some of the protocols.

Shortly after ligation there is a distinct hydro-ureter with hydronephrosis. This is usually present at the end of two hours. The kidney is very much enlarged, weight (opened) greatly increased. At first there is a distinct venous congestion and on section of kidney considerable amount of blood escapes. Later this bluish tinge of the kidney disappears and is replaced by a marked dilatation of peritoneal veins which represents the anastomosis between vessels of the kidney and the adrenal, also of the renal with, probably, an intercostal vein. At the end of twenty-four hours a marked perinephritic edema is visible. After two or three days this disappears. The cortical tissue of the kidney after the initial venous congestion is thickened and distinctly paler.

It would seem from our experiments that in from 10 to 15 per cent. of the ligations such gross and extensive changes in the kidney have taken place, as would have required in man further surgical operation to relieve, but the animals have gone on and lived without apparent discomfort. An atrophy occurs without such gross and extensive surgical change in the kidney in from 80 to 90 per cent. of those cases in which the ureter has been ligated. It is definitely proved that ligation of the ureter is an accident that is not to be absolutely disregarded, and it is a bad procedure to ligate a ureter to get rid of the kidney (Nierenausschaltung).

Experiments and Protocols.

Dog. 1. Operated June 20. Ligation of left ureter, high up near the kidney. Destroyed July 20. Large amount of pus in urine and a number of organisms; staphylococci. Marked hydronephrosis. Left ureter dilated, ligature not found.

Dog 2. Weight 7 kilo. Operated July 20. Left ureter ligated near kidney. Destroyed July 21. Weight left kidney

27.39 grams. Weight right kidney 20.69 grams. General fibrinopurulent peritonitis. Slight dilatation of left ureter. Kidney somewhat paler and enlarged.

Dog 3. Weight 9 kilo. Operated July 19. Ligation near bladder. Destroyed July 25. Weight left kidney 37.9 grams. Weight right kidney 33.5 grams. Left kidney shows marked hydro-ureter. Abscess in kidney; staphylococci. Urine markedly bile-stained. Sponge in abdominal cavity.

Dog 4. Weight 8.5 kilo. Operated July 27. Ligation left ureter near bladder. Destroyed July 28. Weight left kidney 34.5 grams. Weight right kidney 18.8 gram Marked edema around kidney. Kidney much congested (arterial) and paler than normal. Much larger. Cortex thickened. Ureter dilated and tense. Small syringe full of urine removed and culture taken on agar and bouillon. No growth on agar. Contaminated growth on bouillon.

Dog 5. Weight 8 kilo. Operated June 20. Left ureter ligated near bladder. Destroyed July 12. Autopsy by Dr. Barrett. Left kidney surrounded by mass of adhesion from which pus escapes. On removing kidney from mass of tissue a large communicating abscess found in upper pole of kidney, showing an enormous destruction of tissue. Kidney is enormously dilated. Ureter not found—lost in mass of adhesions.

Dog 6. Operated July 27. Left ureter ligated near bladder. Destroyed July 29. Kidney opened and urine allowed to escape before weighing. Weight left kidney 21 grams. Weight right kidney 16.9 grams. Large amount of urine escaped. No peritonitis. Kidney enlarged—hydro-ureter; hydronephrosis. Same general picture is present as is shown twenty-four hours after ligation.

Dog 7. Weight 4.5 kilo. Operated July 21. Ligation of left ureter near bladder. Destroyed August 18. Weight left kidney 48.9 grams. Weight right kidney 42.6 grams. Left ureter dilated and thickened. Pelvis of kidney dilated. Dilated vessels over kidney. Kidney harder in consistency.

Dog 8. Weight 6 kilo. Operated July 27. Left ureter sectioned and ligated near bladder. Destroyed August 2. Abdominal wound showed a few stitch abscesses, intestines bound to abdominal wall. On removing intestines in region of severed ureter a few adhesions broke up from which a mass of pus and urine escaped. Kidney enormously distended, marked distention of pelvis of kidney and numerous miliary abscesses, especially in cortex. Pelvis slightly granular. Kidney distinctly paler than other. Kidneys before opening weighed: Left 58.8 grams. Right 20.8 grams. Culture from abscesses shows staphylococcus pyogenes albus in pure culture.

Dog 9. Operation July 27. Ureter kinked by folding and tying loosely with twenty-day catgut. Destroyed August 10. No change in kidney but a distinct kink of right ureter found. Ligature still attached, slight thickening of ureter about ligature. No cultures.

Dog 10. Weight 7 kilo. Left ureter ligated. Destroyed at end of two and one-half hours. Weight left kidney 18.2 grams. Weight right kidney 11.8 grams. Kidney distinctly enlarged and congestion, more of a bluish tinge. Cortex thickened—ureter dilated. When kidney was cut a large amount of blood escaped. Distinct hydro-ureter. Culturedry.

Dog 11. Weight 7 kilo. Ureter *not* ligated. Bladder much distended—the ureters somewhat dilated. Weight left kidney 20 grams. Weight right kidney 23 grams. Culture taken from bladder is negative. This shows normal relative weight of two kidneys and freedom of bladder and urine of microörganisms.

Dog. 12. Ureter *not* ligated. Bladder urine culture. Pure coccus—large numbers; to be worked out. Culture shows contaminated growth.

Dog 13. Weight 9 kilo. Ligature left ureter near bladder. Destroyed in two hours. Weight left kidney 35.3 grams after some urine had been aspirated for culture. Weight right kidney 30.9 grams. Culture also taken from bladder

at operation. Pelvis kidney considerably distended. Cortex thickened, tissue moist and distinctly paler than other. Cultures negative.

Dog 14. Weight 5 kilo. Right ureter ligated. Similar to 13. Destroyed in three hours. Distinct hydronephrosis. Some urine escaped in attempt to make culture from ureter, which was not successful. Culture taken from bladder urine, however. Weight left kidney 11.7 grams. Weight right kidney 11.8 grams. Cultures negative.

Dog 15. Destroyed four hours after ligation of left ureter. Weight left kidney 35 grams. Weight right kidney 25.5 grams. Left kidney very much enlarged, pale. Very moist on section—cultures from bladder and ureter negative.

Dog 16. Weight 9 kilo. Left ureter ligated. Killed at end of twenty-four hours. Kidney enormously enlarged. Urine removed from ureter for cultures, under enormous pressure. Cultures negative. Left kidney after urine was mostly removed weighs 48.7 grams. Right kidney weighs 32.2 grams.

Dog 17. August 10. Weight 5.5 kilo. Left ureter ligated. Weight left kidney 25.6 grams. Weight right kidney 20.2 grams. Both kidneys halved before weighed. Vessels over left kidney markedly injected. Kidney very pale; calices markedly distended. Distinct hydro-ureter. There are a number of small white areas throughout cortex, seem like abscesses, but there is no area of hyperemia. Kidney rather friable. Culture taken from ureter negative.

Dog 18. Weight 5.5 kilo. Operated August 10. Destroyed after three days. Left ureter ligated. Kidneys not weighed in fresh but apparently same size. Scarcely any perinephritic edema. Left kidney much paler. Ureter dilated and pelvis deeper and plainer. Urine taken from pelvis not under much pressure. Urine cloudy. Miliary abscesses found in cortex.

Dog 19. Weight 6.5 kilo. Operated August 10. Destroyed August 12, forty-eight hours after operation on

left ureter. Left kidney enlarged but apparently not so much as is seen twenty-four hours after ligation. As in the latter, however, there is marked perinephritic edema. The kidney is very moist. There is a distinct hydronephrosis and the area markings of calices are more marked than twenty-four hours after ligation. Weight left kidney minus urine 30 grams. Weight right kidney 18.3 grams.

Dog 20. Operated August 10. Destroyed August 17. Weight left kidney 47.1 grams. Weight right kidney 40 grams. Ureter ligated with a loop to be loosened later. Bladder urine negative. Ureter completely occluded after seven days. Large amount of urine in pelvis of kidney. Markedly dilated. Vessels peritoneum dilated. Pelvic hyperemia. Cortex somewhat paler. Cultures taken.

Dog 21. August 10. Dog died. Culture bladder taken. Culture negative.

Dog 22. Weight 10 kilo. August 10. Ureter divided and imbedded in abdominal wall—absorbable catgut used. August 19. Fistula explored—ureter found—urine escaping. Allowed to fall back into abdominal cavity. Urine flows through wound. Cultures taken from ureter negative. Second examination, August 24. Wound healed. Left ureter markedly dilated as well as kidney pelvis. Specimen fixed in Kaiserling without opening. Wound of ureter closed by retraction and apparent invagination. Ureter thickened.

Dog 23. Weight 4 kilo. Operated August 17. Destroyed August 24. Left kidney opened, minus ureter, weighs 8.73 grams. Right kidney weighs 10.20 grams. Dilatation of vessels similar to others. No marked hydro-ureter or hydronephrosis.

Dog 24. Weight 4.5 kilo. Operated on August 17. Destroyed August 23. Dog specially lively. Left ureter markedly distended as well as pelvis. Veins of peritoneum distended, evidently vein below renal vein is an intercostal vein. Kidney distinctly pale—slight evidence of an infection in pelvis kidney. Left kidney weighs 16.95 grams. Right

kidney minus ureter, minus urine weighs 18.25 grams. Cortex markedly hyperemic.

Dog 25. Weight 5.2 kilo. Operated August 17. Destroyed August 27. Weight left kidney unopened 20.12 grams; weight left kidney minus urine 19.30 grams; weight left kidney minus ureter 17.7 grams; weight right kidney unopened 16.9 grams; weight right kidney, minus urine, 16.5 grams; weight right kidney minus ureter 16.3 grams. Left ureter had been ligated. Dilatation of veins not so prominent—otherwise similar to other kidney but paler.

Dog 26. Weight 5 kilo. Operated on August 17. Destroyed August 22. Weight left kidney opened 19.85 grams; weight right kidney opened 19.22 grams. Some dilatation of pelvis of left kidney though it is not especially enlarged but is paler than other. There is marked dilatation of veins of peritoneum. Wound of dog gaping.

Dog 27. Weight 8.5 kilo. Operated on August 17. Destroyed August 26. The right kidney was ligated instead of the left. The veins of the peritoneum are markedly dilated. Kidney pale—anastomosis between the adrenal, renal, and a vein below the renal, probably an intercostal. Left kidney weighs, plus ureter, plus urine, 23.95 grams; left kidney weighs, minus ureter, plus urine, 23.5 grams; left kidney weighs, minus ureter, minus urine, 23.25 grams; right kidney weighs, plus ureter, plus urine, 47.82 grams; right kidney weighs, minus ureter, plus urine, 47.52 grams: right kidney weighs, minus ureter, minus urine, 26.39 grams. Right pelvis markedly distended and calices somewhat hyperemic, while cortex is pale.

Dog 28. Operated August 17. Left ureter ligated. Living and apparently perfectly well.

Dog 29. Weight 4.2 kilo. Left ureter ligated. Operated August 17. Destroyed August 25. Kidney similar to that observed 7 days after ligation. Left kidney weighs, plus ureter, 14.5 grams; left kidney weighs, minus ureter, plus urine, 13.75 grams; left kidney weighs, minus ureter, minus

urine, 12.35 grams; right kidney weighs, plus ureter, 11.80 grams; right kidney weighs, minus ureter, plus urine, 11.52 grams; right kidney weighs, opened, 11.45 grams.

Dog 30. Weight 4.5 kilo. Operated August 17. Left ureter ligated. August 18 found dead. Ureter and pelvis of kidney on left side somewhat dilated. Left kidney opened weighs, 20.3 grams; right kidney, 16.4 grams.

Dog 31. Operated October 5. Destroyed December 8. Dog not well. Purulent discharge from femur near knee. kidney not opened or weighed—similar apparently to that of 32.

Dog 32. Operated October 5. Destroyed December 5. Dog sick. Kidney can be palpated through abdominal wall. Kidneys not weighed. Enormous dilatation of kidney (a mere shell of kidney tissue with purulent urine). Evidently compensatory hypertrophy of the other kidney.

Dog 33. Operation October 5. Ligation left ureter. Destroyed December 5, at which date the dog seemed in good shape and apparently in perfect health. Autopsy reveals hydro-ureter but kidney distinctly atrophied on the left side. Right kidney larger than normal, apparently compensatory hypertrophy.

Dog 34. October 5. Ligation of left ureter. Dog apparently well and in perfect health at this date.

Microscopic Examination, Showing Typical Findings at Various Times after Ligation.

Dog 15. Typical of early ligations. Ligated for four hours. Presents the picture of a general dilatation of the tubules. This dilatation is less marked in the straight tubules. The lumina are filled with a granular detritus. The parenchyma is distinctly compressed and at the same time presents a distinctly granular appearance. The glomerular spaces are distended and filled with granular material. The small veins near the pelvis are filled with red blood cells.

Dog 26. Ligated six days. Shows in addition to what was visible in dog 26, a deposit of colloid-like material in the convoluted tubules, some of which are markedly distended and filled with detritus.

Dog 33. Ligated two months. The straight tubules present epithelium more or less intact. The lumina, however, are invisible. In the cortex there is a marked increase in connective tissue, at the same time the increase in connective tissue is marked around the glomeruli. The bloodvessels are distinct and apparently thickened. The glomerular picture is remarkable in that the change here is not marked. There is some endothelial proliferation, and the glomerular space in many instances is almost completely obliterated. In the various tubules of the cortex, the epithelial cells are distinctly flattened and atrophied and filled with a colloid material.

Conclusions. 1. Ligation of one ureter is followed by a primary hydro-ureter and hydronephrosis which results in ultimate destruction of kidney function as a result of pressure atrophy of the secreting tubules.

2. Not infrequently infection and suppuration of the kidney may follow ligation of its ureter due to lessened resistance in the kidney as a result of circulatory changes.

3. The microscope shows very strikingly that the greatest effect histologically is exerted upon the tubular structures and that the glomeruli are only slightly involved as a result of the fibrous deposits accompanying atrophy (this will be the subject of further study).

4. Pyelonephrosis and pyonephrosis may occur from hematogenous infection in such kidneys leading to their complete destruction functionally and anatomically.

5. Experimental animals may present no apparent symptoms though suffering from marked hydronephrosis or pyelonephrosis. This may possibly be true in man as regards subjective symptoms.

6. Embolic septic processes may ensue following hematogenous kidney infections though the latter present no apparent symptoms.

7. The ligation of the ureter for the purpose of eliminating the kidney or its function (Nierenausschaltung) in the presence of ureteral fistula or the accidental ligation of a ureter is not without danger and under such conditions if restoration of the lumen of the ureter is impractical or impossible, nephrectomy should be the procedure of choice.

8. Ureteral fistulæ are sometimes spontaneously cured by cicatrization and occlusion of the ureter and secondary atrophy of the kidney.

Literature

1. Cullen. Cancer of the Uterus, 249.
2. Sanger. Cancer of the Uterus, 270.
3. Orth. Pathologische Anatomie, ii, 135.
4. Lepine and Porteret. Id., ii, 136.
5. Cohnheim. Id.
6. E. Aufrecht. Die Entstehung Fibrinosen Harncylinder und der Parenchymatose Entzund, Centralblat f. d. med. Wissenschaft, No. 19, 219; Virchow's Jahresbericht.
7. Hansemann. Deut. med. Wochensch., Band xxiii, 239.
8. J. Straus. Des lesions renales dans leur rapport avec l'hypertrophic cardiac, Virchow's Jahresbericht.
9. A. Holste. Ueber Harn-leiterunterbindung, Inaug. dissert., Gottingen.
10. Brandford. Lancet, ii, 1533.
11. Guyon and Albanon. Annale des mal. des organ gen.-urin., Tome xv, 1200.
12. B. MacMonagle. Amer. Jour. Med. Sci., December, 1899.
13. Cullen. Cancer of the Uterus, 247, 249.
14. Schatz. Montgomery's Text-book, 669.
15. L. Landau. Nierenausschaltung durch Harnleiterunterbindung, Deut. med. Wochen., 1900, No. 47.
16. Amos on the Effect of Ligature of One Ureter, Jour. Path. and Bact., Edinburgh and London, 1904, 1905, x, 265 to 286.
17. Bainbridge. The Effect of Ligature of One Ureter, Jour. Path. and Bact., Edinburgh and London, 1906, xi, 421 to 425.
18. Kibbe. Results of Ligation of One Ureter, Occidental Med. Times, San Francisco, 1901, xv, 45 to 49.

DISCUSSION

Dr. Albert Vander Veer, of Albany, New York.—Dr. Frank's talk in connection with his experimental work on ligation of the ureters has been very interesting to me, and I am sure all of us will read with instruction and profit later on the paper when it shall have been published in the Transactions in full. This accident of ligation of the ureter has left behind it some unpleasant conditions. I have two cases in mind, one of which was operated upon by a colleague of mine, and the patient suffered decided pain in the right lumbar region for six years after the operation. It was the right ureter that was ligated with silk ligature. Some adhesions were broken up and unwittingly the ureter was included, and this patient, as I have said, continued to suffer more or less, and so much so that at last she was determined to have an operation for relief.

The case came under my observation and careful examination revealed that she had a pus kidney on the right side. I made an exploration. I found a sacculated condition of the kidney in which there were a number of abscesses very much like those in the specimen that has been passed around. The kidney was removed. This patient made a slow recovery, and was well afterward. Ligation of the ureter in her case certainly resulted in a train of symptoms which went on for a number of years and resulted in disease of the kidney.

Another case occurred in my own practice, where the ureter was injured in doing a vaginal hysterectomy. This patient suffered from a condition of gradual leakage of the urine, coming on sometime after the operation, and the kidney gave evidence of distention. I only speak of this in connection with the symptoms, which[1] were relieved by packing the vagina thoroughly up against the point where I could see the urine escaping, packing it with sterile gauze very firmly indeed, and I had the satisfaction of seeing this ureter restored to its normal caliber and go on functionating, the patient being entirely relieved of any irritation of the kidney.

Dr. Robert T. Morris, of New York City.—At the time I made the point that ligation of the ureter did not cause much

[1] It is possible I may have included partly or completely the ureter, and when the ligature let up the escape of the urine presented. In my own practice this is the only case in which I am conscious of having done any injury to the ureter.

damage, I did not mean to convey the idea that such an accident was not followed sometimes with ill consequences. The point I tried to make at that time was that the ureter is sometimes ligated in pelvic work by surgeons who do not know they have ligated it, and the patient never finds it out. There are other cases in which the ureter is ligated and it is known soon by the surgeon and patient.

I am very glad, indeed, that Dr. Frank's experiments have been made, and that they prove the point that we may ligate the ureter in some cases without knowing, from any harm subsequently, that it has been done.

Dr. J. Wesley Bovée, of Washington, D. C.—I am sorry that I did not hear Dr. Frank's paper. I am quite in accord with what Dr. Morris has said with reference to ligation of the ureter, and I wish to say, it is perfectly safe to ligate a ureter that is passing normal urine, and it is perfectly safe to leave that up to the limit of six weeks. If you remove the ligature any time within that six weeks the function of the kidney is resumed and it will continue to functionate. But beyond that time, so far as experimentation is concerned, its function is totally ended.

As regards the symptoms when you ligate the ureter, you will get a little tenderness in the region of the kidney for a day or two; the patient will get a diminution in urine which, at the end of twenty-four hours, begins to increase in quantity, and in from forty-eight to seventy-two hours the other kidney is doing the work of both kidneys completely. That point has been borne out both by experimental work and by clinical experience. The ureter may be ligated and yet give very little evidence of it in the way of symptomatology. It is quite a different matter, however, if both ureters are ligated.

Dr. H. A. Royster, of Raleigh, North Carolina.—From all we see and hear, it would seem that it is not a matter of great importance if we should injure a ureter or two after all. Not one hundred miles from here there is a noted gynecologist who, in his text-book, speaks of six cases where the ureters were ligated by him. I admit that I have tied the ureter three times and one of my patients died.

There is one rule that will guide us in this matter, and that is the suggestion of Billy Baxter, who says, "What you don't know won't hurt you," and the man who frequently injures ureters is the man who looks for them too much. It would

appear from this discussion that if we have so many cases of ligations of the ureter that do not amount to anything, we do not need to look for them at all.

I agree with Dr. Frank that it is a more serious matter than we are willing to admit, and sometimes patients die following ligation of the ureters. We must confess, however, that one or even both ureters have been ligated and nobody knew it.

Dr. Guy Leroy Hunner, of Baltimore.—It is an extremely important matter for us to know that in 70 per cent. of the cases we may ligate a normal ureter with impunity. Occasionally in serious pelvic inflammatory conditions, and occasionally in large tumors, such as myomata or ovarian cysts, we find during the course of the operation that a section of the ureter has been removed with the tissues taken from the pelvis or with the tumor. After an extensive operation of this sort it is very important for us to know that we do not have to turn the patient over and do a nephrectomy. In other words, we can simply tie the ureter and leave it. I firmly believe that ureters are tied without our knowing it. I have tied to my knowledge three ureters, and I think it is the proper thing to speak of these cases in a meeting of this sort because of the lessons that may be drawn. Two of these ureters were tied in the same patient, and the other one was tied in a patient suffering from a condition similar to the first, that is, cancer of the cervix; and cancer of the type which we usually consider the easiest of removal, that is, the epithelioma that grows downward into the vagina, forming a large cauliflower-like growth on the end of the cervix. It is a type of tumor that does not extend up into the broad ligaments and involve the ureters in any way. It is so comparatively easy when the surgeon gets in and finds the broad ligaments are not involved, that he is likely to omit the usual caution about the ureters. The ureters, while not involved in the growth, are apt to be displaced by the distended vaginal vault. In the first case, which was an extremely easy operation for one of that type, that is, epithelioma of the cervix, the patient secreted no urine in the first twenty-four hours. On taking her to the operating room and attempting to pass catheters, I found I could not get a catheter in either ureter, and I decided that I had tied the ureters. The patient had no uremic symptoms; she had recovered from the operation unusually well and was in good condition, except that she passed no urine. On opening the abdomen at the end

of twenty-four hours I found I had not only tied both ureters, but had cut them off in cutting the uterine vessels. I implanted the ureters into the bladder, and recently, in looking up some cases of uretral work, I wrote the physician who referred the case to me, asking when the patient died. The operation was done six or eight years ago, and I supposed she had died from carcinoma, but he reported that she was in "blooming health."

In a second case, which occurred about a month ago, of exactly the same type of epithelioma of the cervix, which grew downward into the vagina, I severed the right ureter at a point four or five centimeters from the bladder. I had tied it, and cut it off with the uterine vessels on that side. I anastomosed the ureter end to end. I have not had the opportunity of introducing the ureteral catheter to see whether it has recovered but to all appearances she has had no trouble whatsoever.

Dr. Richard A. Barr, of Nashville.—In view of the statement made by Dr. Bovée with regard to ligating both ureters, we will have to modify Dr. Royster's position and look out for the ureter on one side at least. If we accidentally ligate one ureter and do not know it, it is a source of comfort to be ignorant of that fact when we get no ill effects. If we ligate both ureters accidentally we get no uremic symptoms for a week or ten days, since we get an abstructive type of anuria with a silent stage. This gives us time to find out our mistake and remedy it before serious damage has been done. Dr. Bovée states that an obstruction overcome within six weeks does not result in injury to the kidney. It is even possible then that the obstruction may be spontaneously overcome within a safe period if very small catgut is used in doing the ligation.

I think the point made by Dr. Hunter is one of utmost practical importance, that is, what shall we do in an emergency? Of course we do not want to deliberately tie the ureter even though in 95 per cent. of cases we get no ill effects from it, except in emergencies. In some cases we are confronted with the necessity of tying the ureter, or implanting it in the bowel or upon the surface of the body unless a primary nephrectomy is done. Under such circumstances where we are sure that the patient has another kidney, it is the safest plan to simply ligate the ureter and do nephrectomy at a later operation.

Dr. R. C. Coffey, of Portland, Oregon.—A professional friend of mine ligated both ureters; three days later he opened the pelvis of the two kidneys; the patient never noticed any

trouble at all. The fistula healed up as soon as the catgut was absorbed, and that was all there was to it.

Dr. Felix E. Balbridge, of Huntsville, Alabama.—I question very much whether it ought to go out as the stamp of approval of this Association that there is no danger in tying the ureter. My experience has been unsatisfactory in that regard. I recall one case in which I tied the ureter, and the patient died five days thereafter. Of course, one case may not prove an exception to the rule. I may have tied a great many ureters with no untoward results.

Dr. Frank (closing).—The last speaker has practically brought out the point I would like to make, that ligation of a single ureter is not devoid of danger, and should not be knowingly or intentionally done, as I know has been done where the ureter had been previously accidentally divided.

Following ligation of a ureter we may have an abscess formed in the kidney, and yet no infection of the wound by which the ligature is applied exists. Brewer has shown by experimental work that traumatizing a kidney will result in abscess formation as a consequence of hematogenous infection.

Regarding what Dr. Bovée has said, we have found that the kidney function is not absolutely destroyed even as long as ten weeks after ligation. We have attempted to do ligations following experimentally the happenings in actual surgical experience; that is, we have used catgut, which is soon absorbed, and have also placed a temporary ligature around the ureter, removing it at the end of ten days. We have found that in fistulæ following section of the ureter the mucosa of the ureter may retract, a cicatrix form, and the ureter at the point of section become secondarily obstructed as a result. We have had this occur in our work. Following the absorption of catgut used for ligation with the subsequent formation of a fistula, the urine has always found its way out through the wound in the abdominal wall.

Our work has been carried out through a transperitoneal small incision under the most strict asepsis. Suppuration of the kidney has occurred when there were no microörganisms in the bladder.

Bacteria-free pus has also been found in some of our experiments accumulated in the dilated ureter and kidney pelvis.

CANCER OF THE RECTUM AND LOWER SIGMOID, WITH THE REPORT OF AN UNIQUE CASE

By Miles F. Porter, A.M., M.D.
Fort Wayne, Indiana

According to Stierlin,[1] 1 in every 300 deaths is due to cancer of the rectum, and 3.5 per cent. of all cancer deaths.

Abbe[2] says that three-fourths of all intestinal tumors are cancer of the rectum. Cancer of the rectum is twice as frequent in males as in females.

In cancer of the rectum and sigmoid as in cancer elsewhere success in treatment depends largely on an early recognition of the trouble. Unfortunately "early recognotion" of cancer of the rectum or sigmoid is practically unheard of.

Martin[3] says that most cases of malignant disease of the rectum are beyond the pale of justifiable surgery when first seen by him.

Chalier[4] found but 60 per cent. of the cases in his clinic operable and cites the statistics from other clinics showing the percentage of operable cases to vary from 19 to 81 per cent.

According to Kocher cancer of the rectum is at first symptomless. Most cases are of two or three years' dura-

[1] Annals of Surgery, 1890, xi, 206.
[2] Keen's Surgery, iv, 155.
[3] Hemmeter, Diseases of Intestines, ii, 659.
[4] Journal of the American Medical Association, 1911, lvi, 77. Abstract Arch. Gén. de Chir.

tion when they first present themselves to him for the treatment. He says stenosis and ulcer cause the first symptoms.

A fuller appreciation of the frequency of cancer of the rectum and sigmoid will lead to a larger percentage of timely diagnoses. Hort's[1] investigations seem to show that, in the absence of infection, a raised antitryptic blood content is of value in deciding a doubtful opinion as to the presence of malignant disease, and especially in distinguishing between innocent and malignant neoplasms. I know of no other investigator who either corroborates or rejects Horts' findings. The reports as to the value of hemolysis in the diagnosis of cancer are at variance.

Ottenberg and Epstein[2] say that the hemolytic reaction cannot be relied upon as an aid in the diagnosis of cancer, while Kelling,[3] as the result of a large experience, regards it as positive.

It would seem that further research is necessary before we can speak positively of the value of the blood tests in the diagnosis of cancer. Less stress is laid upon the so-called cancer age now than formerly. Cancer not infrequently affects the young, and this seems to apply with special force to cancer of the hollow viscera of the abdomen. I have in mind now especially the reports of cases of malignant disease involving the appendix and rectum. Of 115 cases of cancer of the rectum at the Rostock[4] clinic 4 occurred in patients between fourteen and seventeen years of age.

The necessity of thorough examination of all patients complaining even in the slightest degree of rectal symptoms should be urged upon the general practitioner because it is

[1] Journal of the American Medical Association, 1909, liii, 1516. Abstract British Medical Journal.

[2] Archives of Internal Medicine, June, 1909.

[3] Journal of the American Medical Association, 1909, liii, 1523. Abstract Klin. med. Woch., Wien.

[4] Annals of Surgery, 1900, xxxii, 861.

he who sees these patients at a time when operation promises the most satisfying results. I am constrained to believe that surgeons also are somewhat derelict in this matter of thorough rectal examinations.

Pewsner[1] advises the routine use of the sigmoidoscope by the internists. Constipation, tenesmus, false impulses to defecate, dilatation of the ampulla, and the relaxation of the anus are frequent symptoms of rectal cancer. Digital examination of the rectum would better be made with the patient standing. With the patient in this position one can often reach lesions that would be out of reach with the patient lying down. Examinations under ether are not infrequently necessary, and in not a few cases exploratory laparotomy, as recommended by Allis in 1895, should be done.

Every rectal neoplasm should be regarded as malignant until it is proved to be innocent.

In this connection it should be remembered that benign and malignant neoplasms may coexist, and that benign tumors may become malignant. Tuttle[2] says that papilloma and adenoma may be transformed into carcinoma and he also emphasizes the well-known fact that the most accessible portion of a given neoplasm may show no signs of malignancy while other portions may be characteristically malignant.

Cancer of the rectum or sigmoid rarely if ever develops from ulcer, fistula, or stricture. It is important to remember, however, that cancers of this region are peculiarly prone to infection. Not infrequently non-malignant tumors are removed under the impression that they are malignant, and palliative operations are done for supposed malignant conditions which subsequent events prove to be non-malignant. Cures following colostomy for supposed malignant disease may be explained on the ground of mistaken diagnosis.

[1] Journal of the American Medical Association, Abstract, 1910, lv, 1152.

[2] Diseases of Anus, Rectum, and Pelvic Colon, pp. 779, 781.

McCosh[1] reports a case in which he excised a growth under the impression that it was malignant and made an abdominal anus. Later the growth was found to be benign and the ends of the gut were united.

Brewer[2] reports a case in which on opening the abdomen a supposed inoperable cancer of the sigmoid was found. A colostomy was done and the patient improved so much that at her request the colostomy was closed. At the second laparotomy the sigmoid was found normal in appearance. Brewer regarded the condition of the sigmoid in this case as due to syphilis.

Stimson,[3] at the same meeting, reported a similar case in which the mass was in the transverse colon. At the autopsy three years later no trace of growth was found.

Case.—December 12, 1907, I operated at Hope Hospital, on Mrs. Y., who was referred to me by Dr. Ely, of Plymouth, Indiana. The patient had been having fecal vomiting for forty-eight hours when she was admitted. On opening the abdomen there was found what was taken to be an inoperable carcinoma of the lower sigmoid. The gut was divided well above the disease, the lower segment closed and dropped and the upper end anchored in the wound establishing an inguinal anus.

The patient was discharged from the hospital nineteen days after the operation. Some months later I saw the patient at her home. She seemed to be in good health but was anxious to have the artificial anus closed. I explained to her why this could not or should not be done. The artificial anus at this time seemed quite small, due to cicatricial contraction. Later this contraction increased until it became very difficult for the bowel to empty itself and the patient suffered severely at times on this account. During one of these attacks of pain there occurred a stool

[1] Annals of Surgery, 1898, xxviii, 519. [2] Ibid., 126.
[3] Ibid.

via the natural anus which was followed by relief. Shortly after this Dr. Ely wrote me that the artificial anus had completely closed and the patient was well.

During a subsequent visit to Plymouth, Dr. Ely had the patient come to his office where I examined her. She seemed in perfect health. No trace could be found of her former trouble. A small scar marked the site of the former artificial anus.

On September 30, 1911 (three years and nine months after the operation), Dr. Ely reports the patient still in good health.[1]

It is well to add that Dr. B. P. Weaver assisted in the above operation, the ether being given by Dr. J. H. Gilpin, and that Dr. Ely, together with the usual nursing staff, witnessed the operation.

Owing to the extraordinary character of this case you will pardon me if I digress for a moment to explain my theory as to how nature reëstablished the continuity of the gut. The upper segment of the gut had a long free mesentery and was therefore movable. The lower end was fixed by adhesions and was quite large and firm from growth of new tissue. It therefore acted as a sort of buttress against which the fecal current forced the upper segment. Naturally adhesions formed where the two segments came into contact and as the result of a combined process, perhaps of pressure, absorption, and ulceration, the continuity was established, and in a short time thereafter the artificial anus was permanently closed. A reference to the illustration (Fig. 1) will make my explanation clear.

These cases are related to emphasize the fact that the diagnosis of carcinoma of the rectum and pelvic colon is often difficult and sometimes impossible without the aid of the microscope.

[1] The case was in my opinion one of diverticulitis. The patient was given no antisyphilitic treatment. The diagnosis of tuberculosis could not be established.

The practical lessons which such cases teach are: (1) That operative relief should be offered to all patients supposed to be suffering with cancer of the rectum and sigmoid no matter how desperate they seem. (2) That radical operations should not be undertaken except upon positive microscopic evidence.

Both Dr. McCosh's patient and mine might have been saved much risk and inconvenience by a microscopic examination made at the time of operation. It goes without saying that surgery offers the only hope of cure in cancer of the rectum and sigmoid.

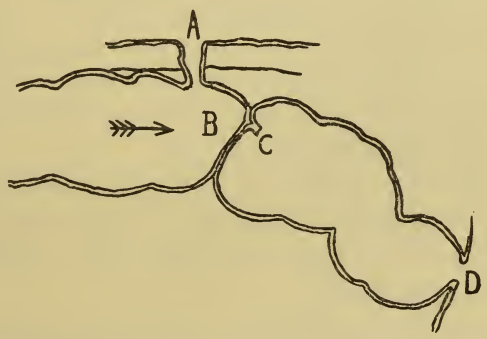

FIG. 1.—Schematic illustration of the probable way in which nature reëstablished the continuity of the gut in the case of Mrs. Y. (*A*) Artificial anus. (*B*) Elbow of gut produced by fecal current, which would naturally be directed as indicated by the arrow, and thereby produce pressure absorption at *B*, which is opposite *C*, the closed end of the anal segment of the gut.

Some failures to secure permanent cures may be accounted for because of the desire on the part of surgeons to avoid opening the peritoneal cavity and some because of a desire to save the anal sphincter.

Of these two causes of failure the latter is the more productive.

Surgeons are losing their fear of opening the cavity of the peritoneum, but that it still exists to a harmful degree in

relation to operations for cancer of the rectum is my firm conviction. Opening of the peritoneal cavity *per se* adds no material risk if properly done to the operation, but, *per contra*, by increasing the mobility of the gut it offers an additional security against insufficient removal of tissue on the one hand, and too much tension with its frequent dire results, on the other. Surgeons not infrequently take great pains to save the sphincter only to find that after all it is relatively useless.

Hartwell[1] says that good sphincters are the exception even when they are "saved," and that substitutes are better. Wollfler's[2] explanation of this fact is probably the correct one. He thinks the inefficiency of these "preserved" sphincters is due to disturbed innervation and consequent diminution of the reflex excitability of the mucosa. Leirman, Lilienthal and others have reported good results with Gersuny's method of treating the gut.

That particular method of operating should be chosen which is best adapted to the case in hand rather than to attempt to apply to all or even most cases a technique to which one may be partial.

The Kraske sacral operation I have abandoned and the Quenu method in which the internal iliacs are ligated I have never used because I have a feeling that the risk which this operation entails is greater than are the benefits it offers.

I think with Hartwell that inguinal colostomy should be looked upon with less disfavor. An artificial anus properly made is not such a source of discomfort as is generally believed. Certainly it results in infinitely less than do many cases of rectal cancer. Moreover, what may seem to be an inoperable condition at the time the artificial anus is made may later on prove to be quite favorable for radical surgery. Then again we must remember in this connection the element of human fallibility as illustrated in the cases

[1] Annals of Surgery, 1905, xlii, 399. [2] Ibid., 1901, xxxiii, 96.

Fig. 2.—Lower four and one-half inches of rectum including anus excised for cancer. The crosses mark the outer limits of the growth, which has raised margins with excavated centre. The mucocutaneous anal border is below. Note the wide margin of healthy tissue around the growth.

of McCosh, Brewer, Stimson and in my own case referred to in an earlier part of this paper.

Where the growth is so situated as to warrant the preservation of the anal end of the rectum I have found Noble's instrument of the greatest value in assisting in the approximation of the two ends of the gut. With the aid of this instrument one can make the approximation secure and with reasonable speed in cases in which without some such aid it would be difficult or even impossible.

When the growth is situated near the anus and especially if it be of the squamous cell variety the excision should include a wide area of skin around the anus. It is well to bear in mind that the inguinal glands are quite as apt to be involved as are the perirectal glands in cancers near the anus. In growths thus situated it is well to begin the operation by sewing the anal opening tightly shut with strong silk or gut, leaving a long loop of thread with which to handle the gut in the further progress of the operation. After the gut is dissected loose and brought down, two clamps are placed well above the growth and the gut amputated between the clamps. This technique removes the danger of disseminating the cancer cells and the danger of infection from the bowel secretion. In women a vertical incision in the posterior wall of the vagina gives the operator more room and makes it possible to remove more of the gut in women than it is feasible to remove by the perineal route in men (Fig. 2). I have a firm conviction that the abdominal and the combined operations will be more frequently used in high growths as we become better acquainted with their advantage.

The abdominal opening with the patient in the Trendelenberg position allows one to get a clear view of the pelvis and to judge accurately of the extent of the lymphatic invasion and of the invasion of contiguous structures; permits preliminary ligation of vessels, thus giving one a relatively bloodless operative field; it makes a safe anasto-

mosis possible in cases wherein it would be impossible from below; and in cases in which the growth is situated lower it permits of the loosening of the rectum down to the anus; it permits the ligation of the common hemorrhoidal trunk above the anastomotic loop, thus allowing the gut to be brought down to skin of the perineum without danger of gangrene, as pointed out by Hartman,[1] of Paris, and others. The accompanying illustration (Fig. 3) is taken from Hartman's article and shows the arterial circulation of the rec-

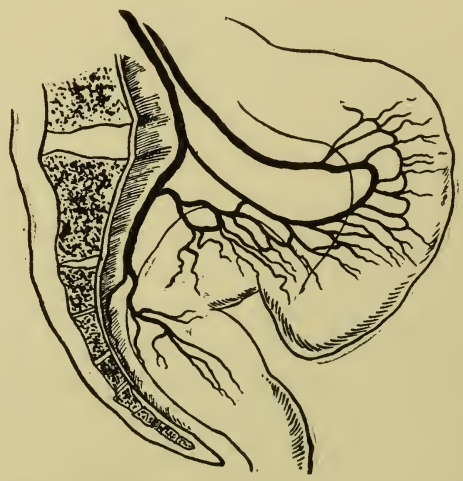

Fig. 3.—Taken from Hartman's article, *Annals of Surgery*, l, pp. 1091 to 1909, showing the arterial circulation of the rectum with the common hemorrhoidal trunk and the anastomosis loop.

tum as determined from injections made in his laboratory.[2] Hartman in his paper reports four recent abdominopelvic operations with one death and three cures. He points out the fact that the death, which was due to hemorrhage,

[1] Annals of Surgery, 1909, l, 1091.

[2] C. B. Davis, in an article in the Annals of Surgery, October, 1910, p. 529, says that this anastomotic branch is sometimes absent and in such cases advises that the operation be terminated with a permanent colostomy.

might have been avoided had both ends of the artery been ligated.

As yet the death rate from the abdominal and combined operations is relatively high, but there can be little doubt but that it will rapidly be lowered as experience grows. Jos. A Blake[1] reports 12 consecutive combined operations without a death. This is the most favorable experience with which I am acquainted and is certainly encouraging.

Certainly we must not accept as final the verdict of Abbe[2] when he says: "At best the victims of rectal cancer must be satisfied with a long extension of life, a reduced operative mortality and the relatively slight discomfort of an inguinal anus."

DISCUSSION

Dr. Joseph C. Bloodgood, of Baltimore.—Dr. Porter in his paper considers malignant lesions of the sigmoid. I have had Mr. Cody go over all of the cases of cancer of the colon that have accumulated in the pathological laboratory connected with the Johns Hopkins University, where we get our cases not only from the hospital but from the clinics of Dr. Finney and from St. Agnes', with which I am connected.

In regard to the situation, there were 74 cases of cancer of the large intestine, from the sigmoid to the upper portion of the rectum, with 113 cases involving the rectum. The locality of cancer corresponds to the locality of the inflammatory lesions, and positions where the mesentery is thickened, and where there is ptosis. The cecum was involved in 26 cases; the sigmoid in 22 cases, while the hepatic and splenic flexures were involved about equally, 10 cases; the transverse colon and descending colon only in 3 cases. This is suggestive.

The most important study I think Mr. Cody made was in going over the cases in regard to obstruction. I have not the full details up to date, but of 52 cases, 16 had no symptoms of obstruction, and 36 came under observation because of obstruction. It is remarkable that in the 16 cases there was only one

[1] Annals of Surgery, 1910, lii, 139.
[2] Keen's Surgery, 1908, iv, 166.

cure; that is, when the tumor does not produce obstruction, the symptoms, as a rule, are sufficient to justify opening the abdomen at an earlier period. The patients came with a palpable tumor or with signs of general peritoneal carcinosis. The probability of cure in the cases of obstruction, if they do not appear too late, or do not die of obstruction, is almost 80 per cent. in our cases. If these patients are fortunate to have a tumor that obstructs, if they can get to a surgeon before they are moribund from auto-intoxication, the chances of the surgeon removing that tumor and producing a permanent cure are relatively high. Many of these patients are quite ill when they come in, the symptoms of obstruction are prominent, and operation is done, and very little is recorded of the previous history. These cases generally have sufficient symptoms to justify an earlier opening of the abdomen. The symptoms will often justify us to open the abdomen at an earlier date. The probability of cure in cancer cases is as good as anything else, and the mortality from resection of the large intestine should be small.

Dr. Samuel Lloyd, of New York City.—There is one point, it seems to me, that should be emphasized in the examination of these cases, and that is, the surgeon should not only depend upon the laboratory nowadays, but likewise depend upon the *x*-ray laboratory. This is particularly so in these cases of sigmoid tumor or carcinoma because of the difficulty frequently in making them out with the sigmoidoscope, and also in making them out by palpation. The bowel should be cleaned out, and then bismuth administered twenty-four hours before the examination, and the examination of the large intestine made under the bismuth feeding gives a very good illustration of the point of stasis in the sigmoid, and it will also show, if the tumor is producing obstruction, dilatation of the gut above. My method in doing this is to have an examination made with the *x*-rays before the bismuth is given, the *x*-ray plate being made at the time, and then I examine the patient fluoroscopically, in order that one may watch the peristaltic wave and, at the same time, feed the patient with bismuth and apple sauce, and start at the stomach, watch the peristaltic wave from the stomach to the small intestine until it travels to the large intestine. We have a sufficient amount going into the stomach, starting the peristaltic wave above, the wave being communicated from the intestine, so that it goes finally all the way down

and gives a good illustration of where the peristalsis ceases, which is a good point for locating the tumor or ulceration.

Dr. Charles H. Mayo, of Rochester, Minnesota.—Dr. Porter has brought up a most interesting subject, that is, the curability of these cases of cancer of the rectum and sigmoid. There is no question but many of these so-called benign tumors are in parts really carcinomata, and that many of them considered benign at first will become carcinomatous. In the case Dr. Porter reports nature did much for the individual in not only reëstablishing the anastomosis, but affording temporary drainage.

In going back over some of our old cases, together with the specimens removed, we find there were two cases of diverticula excised as cases of cancer. In these the cure extended over so many years that we were doubtful as to the original diagnosis of cancer. We feel that in a lot of cases diverticula have been removed and incorrectly reported as cancer, especially in the older literature, when the pathological processes were not as carefully worked out microscopically as they should have been, and the clinical part was considered the most important.

Dr. Bloodgood brought up a very important point in regard to the permanency of cure. I do not believe there is a place in the body that gives a better opportunity for the cure of cancer than cancer of the large bowel. In the development of human life we have added to the primitive life the stomach, the large bowel, and bladder. These organs are more subject to disease than others. All of them are prone to malignancy. The colon always harbors germ life. Bacteria find a natural home in the colon, and we expect it. In a case of cancer the colon cuts itself off from the active lymphatic system, so that in cases of malignant disease of the colon, probably half of the people go on to death from perforation or peritonitis, or from total obstruction without extensive involvement of the glands.

The results are improving with experience and with improved technique, particularly if we get these cases early and operate on them promptly. Where the bowel is loaded with fecal matter, and there is total obstruction, operation must necessarily be attended with a certain mortality. Again, in some of the chronic cases, where the bowel is not loaded with fecal matter, particularly in a fleshy individual, with lots of fat around the colon, operation is attended with much more hazard than it is in a thin individual, so that the Mikulicz type of

operation may be employed in fleshy people. According to the location of the ulcer or tumor, one may do an early and rapid resection, but there must be strings to our bow; we cannot confine the work to any one method.

Dr. Porter (closing).—What I wished to emphasize in the paper was this, that cancer of the rectum and lower sigmoid would be equally as curable as cancer elsewhere, and especially is this true of cancer of the lower sigmoid, if it was as early diagnosticated, and the way to diagnosticate this lesion is to either look for it through the open abdomen or by the use of the sigmoidoscope; and in addition to that, if there is a question as to malignancy at the time, one should call to his aid the pathologist and have a frozen section made before a definite operation is determined upon for the cure of the patient.

I would like to emphasize also the fact that nineteetn out of twenty of these patients come to the surgeon either with symptoms of obstruction or ulceration; that most of them come late for operation, too late for the best results to be achieved by surgery. On careful inquiry, as Dr. Bloodgood has pointed out, these patients have given symptoms that should have led to the opening of their belly months before they came to the surgeon. Why do we secure such good results in cases of carcinoma of the appendix? Because on the slightest provocation from symptoms in the right lower quadrant of the abdomen, we open the belly and remove the appendix on suspicion, and the result is we have a most remarkable showing so far as carcinoma of the appendix is concerned. If we could learn from this experience and apply it to carcinoma of the sigmoid and rectum, I think the results would be infinitely better than they are at the present time.

WHERE SHALL THE LINE BE DRAWN BETWEEN MEDICINE AND SURGERY IN BORDERLINE CASES?

By James E. Moore, M.D.
Minneapolis, Minnesota

A very few years ago, when surgery was constantly poaching upon what had always been considered medical preserves, there was a constant controversy between medical men and surgeons, but since surgery has repeatedly demonstrated the possibility of curing diseases considered incurable by medicine, the controversies have grown less frequent and far less heated. Iternists and surgeons have learned to appreciate the services of each other to suffering humanity, and it is only through the continuation and increase of this mutual understanding and confidence that we can hope for the best results. I have enjoyed this atmosphere of mutual helpfulness in both private and hospital practice.

Many diseases may at one time be better treated medically and at another time surgically, and there are others in which physicians and surgeons have not yet found themselves, and it is those we wish to discuss today.

All diseases of the thyroid except malignancy and tumors are medical in the early stages, because at that time a majority of them can be cured without operation. Many of them become surgical when neglected, or when non-surgical treatment fails. A case of goitre becomes surgical as soon as it gives serious symptoms which fail to yield to proper medical treatment. The danger is that it may be kept on

the medical side of the borderline until the best time for operation has passed While a careful study of the results of both physicians and surgeons in the treatment of this disease indicates that surgery should be the last resort, it demonstrates very clearly that it should not be a late resort. This is especially true in exophthalmic goitre, because a late operation is dangerous and delay allows changes to take place in the heart and other organs that can not be cured, while an earlier operation is comparatively safe and very often curative. Since surgeons have demonstrated that the average goitre can be easily and safely operated upon, many unnecessary operations have been performed. No patient should be operated upon simply because he has a goitre, but only for positive indications. On the other hand, physicians should learn to recognize promptly those cases that do not yield to medical treatment, and give the patient the benefit of what surgery has to offer.

Diseases of the breast are always surgical. In face of the facts that 80 per cent. of tumors of the breast are malignant, and that the mortality of cancer without surgical treatment is 100 per cent., it is difficult to understand how any man can have the temerity to treat a nodule in the breast by any but surgical means. Every man who examines a nodule in a breast assumes a grave responsibility, and he owes it to himself as well as to his patient to give a positive opinion, or to admit that he is unable to do so. It is a crime to paint a nodule in a breast with iodine and await developments, for the chances are that in four out of five cases it is malignant, and when it is malignant, the patient's only hope is in an early operation. These remarks are applicable to tumors in all parts of the body, save that the percentage of malignancy is not so large in most other parts. Medicine has no place in the treatment of malignancy or tumors.

In diseases of the chest there is undoubtedly a great future for surgery, but at the present time it is comparatively limited. Accumulations of pus, whether in the lung, the

pericardium, or the pleura, are always surgical, but beyond this is open territory occupied at present by medicine in which she meets with many failures, and in which, let us hope, surgery may become helpful in the future.

Most diseases of the stomach are still on the borderline. Malignant disease here as elsewhere is always surgical, and when medical men, laboratory men, and surgeons, by their combined efforts, shall have arrived at a means of early diagnosis, as large a percentage of cures should follow surgery here as elsewhere, because this organ is very tolerant of surgery. Even with our present unsatisfactory methods of diagnosis Mayo has recently reported 25 per cent. of cures following operation, as against 100 per cent. mortality without operation. An early diagnosis of cancer of the stomach is not possible with our present knowledge. The clinical evidences come late, and laboratory methods have been disappointing. This is surely a very important field for research. The gastroscope suggests great possibilities. Even exploration through an abdominal wound is often unsatisfactory when palpation is depended upon, because it may be impossible to differentiate between a malignant and an inflammatory condition. Explorations can be made efficient, however, by removing a specimen and making a frozen section, and in any case giving symptoms enough to justify an exploration, the securing of a section is surely justified. With our present methods of diagnosis the danger is that these patients be treated medically until they are no longer favorable surgical cases.

All gastric ulcers are primarily medical, because when promptly recognized the vast majority of them will recover under intelligent medical treatment. They become surgical when they cause perforation, persistent or recurrent hemorrhage, or stenosis, and when for lack of or in spite of intelligent medical treatment they become chronic, with thick walls and hardened bases. The present surgical treatment of gastric ulcer by gastro-enterostomy is far from satisfactory.

It is unphysiological, unsurgical, and at best a surgical makeshift too often leading to disappointment. When we have so completed our technique, as we are bound to do in the near future, that the accepted operation for gastric ulcer is the removal of the ulcer, we will be doing surgery on surgical principles, and we will not be plunging in the dark and upsetting nature's physiological arrangements. Gastro-enterostomy, however, should not be spoken of as it was by one Eastern physician, who called it the great Western fake, because with all its shortcomings and disappointments it has done a vast amount of good, it will always hold a place in the treatment of pyloric stenosis and possibly in duodenal ulcer, and it is undoubtedly a stepping-stone to better things.

Dilatation of the stomach without stenosis is always medical. Surgeons have tried various methods for the relief of this condition, but have failed to secure satisfactory results.

Diseases of the gall-bladder are practically all surgical. Medicine can do nothing for gallstones, or for an infected gall-bladder. The old idea that gallstones often exist for years without causing symptoms is scarcely tenable at the present time. The symptoms have always been present but have been attributed to other causes. When gallstones are known to exist the patient should be operated upon, as medicine can do no good and the operation is less dangerous than the gallstones.

Most diseases of the liver are medical, for up to the present time surgery has demonstrated a very limited field of usefulness. In our northern climate we rarely meet with an abscess of the liver, but when it does occur, of course, the treatment is surgical. We occasionally see a case of hydatid cyst which is successfully treated by drainage. Malignant disease of the liver is practically always secondary and cannot be successfully treated either medically or surgically. Talma's operation for cirrhosis has not been extensively

practised, but deserves a place in surgery because it has often prolonged life and relieved suffering in an otherwise hopeless condition. I have performed the operation a few times, and in no single instance have I had occasion to regret it, for it has always afforded some relief, and in some instances the relief was sufficient to enable the patient to resume his business.

The kidney furnishes many borderline cases. In the presence of stone or pyogenic infection all agree that the treatment should be surgical. The treatment of Bright's disease by decapsulation has been advocated and practised by a few, but has not afforded sufficient encouragement to give it a definite place in surgery. Tuberculosis of the kidney when confined to one organ, as it practically always is in the early stages, should be treated surgically, for under medical care it almost certainly becomes bilateral and causes the death of the patient. Considering the important function of this organ and the magnitude of the operation, the treatment by surgery is remarkably successful. I have patients upon whom I performed nephrectomy for tuberculosis twelve and fifteen years ago, who are alive and well today.

Visceroptoses have swayed back and forth across the boundary line, but at the present time experienced surgeons quite generally agree that surgery is a failure in these conditions. Patients suffering from visceroptosis should not be denied the benefit of surgery for other pathological conditions, but operations for the ptosis will do good in only very exceptional cases. That there are exceptional cases is illustrated by one patient upon whom I performed a hepatopexy. She had been confined to bed for some time on account of the extreme ptosis of the liver. When she laid upon her left side the anterior border of the liver could be felt underneath and parallel with the right rectus muscle. After repeated requests from the patient and her physician I consented to operate. The liver was fastened to the inner side

of the ribs and the diaphragm, where it has remained for over two years, and the patient has been restored to health and usefulness.

Many physicians are disposed to be hypercritical about the numerous scars they see on these patients because the operations have failed to cure. Are they not rather the milestones of progress? for through them surgeons have demonstrated that operation is not the proper treatment for these patients, and they are gladly referring them to physicians who have learned to be very helpful to these suffering and formerly neglected patients. Glenard told the whole profession about these conditions many years ago, and they were neglected until surgeons mistaking them for purely mechanical conditions very naturally reasoned that they could be relieved by mechanical means. Surgeons have demonstrated that there are serious conditions back of these ptoses, and that mechanically restoring the prolapsed organs to approximately their normal positions so commonly fails to cure, that the operations are justifiable in only a few exceptional cases. The replaced organs rarely remain where they are placed, and the operations do not remove the underlying conditions conducive to ptosis.

There is no disease in which there has been more controversy between physicians and surgeons than appendicitis, but now it is quite generally conceded that all cases of appendicitis are surgical, first, last, and all the time. It is undoubtedly true that many patients have been operated upon who would have recovered without operation, but the man has not yet been born who can select these cases, and is it not infinitely better that many should be operated upon who might have recovered without operation than that one should die for want of an operation? The operation in proper hands is not dangerous, and the possibility of future attacks is removed by it. The deaths attributed to the operation by the laity and hypercritical medical men have usually been due to neglect of an early operation.

Many cases of obstruction of the bowels are on the borderline because it is often impossible to decide at first whether the patient is suffering from obstipation, intestinal stasis, or obstruction. In every case of this kind there should be a consultation between the physician and surgeon, and as soon as a diagnosis of obstruction is made the surgeon should take charge. In such a fatal condition as this it is safer to make an exploration in doubtful cases than to wait, for a larger percentage of the mortality is due to waiting.

Tubercular peritonitis is still on the borderline, for it is an open question in the minds of both physicians and surgeons as to how these cases can be most successfully treated. The surgical treatment is purely empirical, but is followed by some astonishing cures, and, on the other hand, many recover without operation. Surgery is most satisfactory in cases with free peritoneal fluid either without local lesions, or with local lesions in some removable organ such as the appendix or Fallopian tube. In cases where the fluid is walled off in separate cavities, and where there are many local foci in the intestines, the outlook is very grave no matter what the treatment, and surgery has certainly very little to offer.

Tuberculosis in all parts of the body furnishes many borderline cases, and whether treated medically or surgically there is certainly great opportunity for improvement over our present methods. I operated for tuberculosis of the glands of the neck for twenty years or more, and have now abandoned it because the results were disappointing. Relapses were common and deaths from general tuberculosis were frequent enough to convince me that the patient's chances are better when he does not depend upon surgery but puts himself under careful hygienic and medical treatment from the first. Tuberculin and the *x*-rays yield at least as good results as operation, and save the patient the trials and dangers of an operation as well as the unsightly scars.

DISCUSSION

Dr. Herman J. Boldt, of New York City.—It was not my purpose to speak at this time, but as no one else seems willing to take the floor, I trust you will pardon me for saying a few words on this paper.

While I am not in a position to cover all of the points made in the paper which has been read, there are a few points to which I desire to call attention.

Dr. Moore has mentioned the question of appendicitis. All patients with acute appendicitis, whether of one form or the other, are invariably, in my opinion, surgical cases. They should be operated upon; but there is a greater number of patients who have a chronic catarrhal inflammation of the appendix, and these may be classed as borderline cases. In this connection I refer to women who have a fat, pendulous abdomen, who are to a greater or less extent neurasthenic, or psychosthenic, who may be cured by intelligent medical care—and by intelligent medical care I do not mean entirely the administration of medicines, but general hygiene, massage, and so forth. Particularly is this true of that class of patients who suffer so much from constipation. There is a large number of such women who get well by intelligent medical treatment.

There is another large percentage of patients who have pelvic inflammation, and perhaps more than half of these may be considered as patients with conditions which are on the borderline between medical and surgical treatment. So it behooves every one of us to carefully study these patients, to give them the benefit of a doubt before we resort to an operation which will cause destruction of a function which is of vital importance to womanhood.

So far as visceroptosis is concerned, and I refer in this instance particularly to prolapsed or movable kidneys, here we have another class of patients who well deserve medical care. There is a very large number of women who have been operated upon when, with the use of judgment, it should have been known that no benefit should be expected from fixation of their kidneys by nephropexy; and these women complain just as much after as they did before operation. On the other hand, many of these women are very much benefited by wearing a well-fitting abdominal supporter. The main point in dealing with this

class of patients is to give them proper hygienic surroundings and careful medical attention. Proper nourishment should not be neglected.

Dr. Samuel Lloyd, of New York City.—Inasmuch as Dr. Moore has invited criticism of his paper, it would be too bad not to gratify his wishes.

I cannot agree with some of the statements that he has made, and, first, with regard to decapsulation of the kidney. As the doctor was reading his paper I thought of a single patient. A man, aged twenty-six years, was brought into my office some years ago, water-logged, having one or two convulsions a day, and evidently near death. The physician who brought him begged me to do a decapsulation, and I said the man would die on the table, and that I would not do it without the consent of the family. The family consented to an operation. I operated on him; his kidneys began to work, and in the course of twenty-four hours began to secrete rapidly. This young man went through four years of active life, doing teaching at night, and was a city employee in the daytime, a thing he could not have done if we had let him alone. If that was the only case, it would be enough to impel me to go on with the work.

As a matter of fact, Dr. Edebohls demonstrated that 30 per cent. of his 102 cases were cured, so far as the clinical appearances of Bright's disease were concerned, and microscopic examination did not reveal any evidences of Bright's disease. Therefore, I still think we should operate in these cases earlier than we have heretofore done.

With reference to the other class of cases, namely, cervical tuberculous glands, in which Dr. Moore does not approve of operating, I cannot agree with him there. I cannot see why we should in the case of a local lesion that can be removed surgically, leave the primary focus intact. On the contrary, I think we should get rid of that focus, whether it is in the tonsil or throat; at least, we should strive to get rid of the active point where the disease is progressing, and put the patient on active hygienic fresh air treatment.

Dr. Charles H. Mayo, of Rochester, Minnesota.—It is a serious matter for the surgeon to do the mechanical part of the work in cases that are turned over to him for operation, and then be held responsible for the future of these individuals after he has operated on them. But if he feels that he is only responsible for the surgical part of the work, it is a poor position

for him to take. When we have a man like Cabot, so honest and industrious in looking after the records of cases, say that practically one out of six of the patients operated on for chronic troubles fail to be relieved of the symptoms for which they went to the surgeon, it is something for us to think about. These questions are constantly coming up, and I feel that patients should be instructed and educated to the point that it may be necessary for them after operations to go to their family physicians, who should look after their future care after we have done with them. In this respect the physician and surgeon should work hand in hand.

Dr. R. S. Hill, of Montgomery, Alabama.—I wish to take issue with Dr. Boldt on his remarks in regard to the chronically inflamed appendix. A man with chronic appendicitis is one with a stick of dynamite in his side which is liable to explode at any time. Now, when we consider the small mortality of interval appendectomy it does not seem to me that we are justifiable in allowing such a person go around attending to his duties, depending upon the general practitioner to handle him with care. Moreover, chronic appendicitis even in its mildest form is frequently responsible for digestive disorders and nervous conditions, which will resist all medical efforts until the offending member has been removed. I heartily indorse Dr. Moore's opinion on this subject.

Again I can not follow Dr. Boldt in what he has said with reference to a loose kidney. I have never seen a loose kidney that was relieved or cured by internal treatment and holding it in place with a belt, nor do I believe the application of a belt will cure the condition. If we succeed at all in retaining a kidney in place by a belt it will, in my opinion, remain there only so long as the belt is in position.

Dr. Moore (closing).—I wish to thank the gentlemen for for their very kindly consideration of my paper. I was rather afraid I would be flattened out by the time they got through.

Dr. Hill has answered Dr. Boldt concerning chronic appendicitis. I am firmly convinced that acute appendicitis is the result of chronic appendicitis; therefore, to avoid acute appendicitis and all its dangers, which is carrying away its thousands, we should remove all chronically inflamed appendices.

I was very glad to hear what Dr. Boldt had to say with reference to pelvic conditions, and I agree with him that they are on the borderline, but he knows more about them than I.

I felt I knew so little about pelvic conditions that I drew no definite conclusions.

I am pleased to agree with Dr. Boldt in his definition of medical treatment; that is, it should be intelligent medical care, hygienic, dietetic, but may all be summed up under the head of medical treatment.

I was very glad to hear what Dr. Lloyd had to say with reference to decapsulation, and that he has been able to save some patients by it. I never did the operation myself, but I have seen a number of patients operated on who died within a few days thereafter, so, naturally, I am prejudiced against it. I hope Dr. Lloyd and his friends will get secure ground to stand upon in the future with reference to this operation.

Dr. Lloyd thinks that in tubercular glands of the neck the local focus should be removed. As I stated in my paper, for twenty years I have been removing tubercular foci, and I have not succeeded very well. I have removed the glands; I have removed everything in sight in some cases, and yet those patients went on and had as much trouble as other patients who were not operated upon. If I have a broken-down gland I scoop it out and inject iodoform emulsion, and such a patient will do better than those patients on whom I have performed more radical procedures.

Dr. Mayo makes a good practical point, and that is, we should have physicians in the operating room. We should have them there to know whether their diagnosis or ours is correct or not, and it should be not only their privilege but their duty to follow up these patients afterward. I make it a point that when a physician refers a case to me, I refer the patient back to him as soon as the surgical aspect has disappeared, because oftentimes, as was brought out in one of the other papers today, prolonged intelligent after-treatment by the internist is essential following operation.

AN OPERATION FOR PROLAPSUS UTERI

WITHOUT DISTURBANCES OF ANATOMICAL RELATIONS AND WITHOUT THE NECESSITY FOR ABDOMINAL SECTION

By Barton Cooke Hirst, M.D.
Philadelphia

Turning the uterus upside down and fixing it in the vagina, hysterectomy, suspending the uterus high on the abdominal wall near the umbilicus, burying it in the muscles of the abdominal wall, injecting quinine or paraffin in the pelvic connective tissue, are examples of the bizarre and unanatomic procedures advocated and practised at present for the attempted cure of prolapsus uteri. It is surprising that operations without the slightest relation to the causes of prolapse, or to the anatomy of the region, should be considered necessary.

For a number of years my clinical material in gynecology has been one of the largest, if not the largest, in a city of a million and a half population, aggregating about 4000 women a year in the ambulatory dispensaries, outpatient service, and ward patients.

It is apparent, therefore, to anyone who knows what such patients are, that cases of prolapse of the uterus are commonplaces in my clinics at the University Hospital and the Howard Hospital of Philadelphia, the number in the last ten years amounting to several hunderd. Out of all this number, not a single patient has returned on account of a recurrence.

It may be said that one does not see one's own failures; that they go to other men. This is true as a rule, but with the average amount of control over my patients, had my failures reached the proportion admitted by many clinics, I should certainly have seen some of them.

It is probable, therefore, that there is something in the routine procedure adopted, based as it is on anatomy and a study of the injuries resulting in prolapse from the moment of their occurrence to their ultimate consequences, which is giving a better result than is the rule in many so-called gynecological clinics dealing only with certain phases and with certain stages of the pathologic phenomena peculiar to women.

Further, as there is nothing entirely original in any one of the three steps in the operation for prolapse, with partial or complete inversion of the vagina, it is perhaps to certain details of operative technique that success is due.

There are three injuries responsible for prolapse which must be kept in mind, and there are three regions which must receive attention, in a uniformly successful operation. The three injuries are: (1) The stretching, with possible actual lacerations, of the fibers of the cardinal ligaments of the uterus in the bases of the broad ligaments supporting the cervix, lower uterine segment, and, indirectly, the vaginal vault; (2) the complex injury of the anterior vaginal wall, consisting in (*a*) an overstretching of the longitudinal fibers of the fascial plate derived from the bases of the broad ligaments, extending downward between the bladder and the vagina; (*b*) a lateral separation of these fibers by the eccentric pressure of the child's head in labor; (*c*) a glacier-like movement of the vaginal wall on its subjacent attachments tearing them loose; and (*d*) a laceration of the muscle and fascia of the urogenital trigonum, the only support of the lower third of the anterior vaginal wall; (3) a laceration of the levator ani muscle in the posterior vaginal sulci, with a certain amount of that glacier-like

movement of the posterior vaginal wall noted in the anterior wall.

With the ultimate results of these injuries we are all familiar: the elongation of the lower uterine segment, the descent of the uterus, especially the lower uterine segment and cervix, the inversion of the vagina, the protrusion of the posterior vesical and anterior rectal walls and the detachment of the vaginal walls from their subjacent tissues so that they descend further than any of the pelvic structures, to the grade of complete inversion and entire emergence from the body.

With the anatomy of the pelvis clearly understood and with the facts in mind as to the original injuries and their results, it is simply a question of surgical carpentering to remedy each defect and to correct it permanently.

The problem presented is to shorten the elongated lower uterine segment, to shorten the elongated cardinal ligaments of the uterus, to insure an anterior position of the latter, to restore the anterior and posterior vaginal walls and their subjacent structures *ad integram.*

Technique. This, I contend, can be done by the following operative technique:

The cervix is seized with double tenacula in each lip; the uterus is pulled as far out of the body as it will come. A longitudinal incision is made in the anterior vaginal wall its whole length. A circular incision is made around the cervix. The anterior wall is dissected free from the bladder and the uterovesical ligament is cut. The cervix is amputated above the internal os; the cervical canal is then dilated and the uterus curetted. The lateral and posterior sutures for an amputated cervix are inserted but not tied. Then a curved needle threaded with No. 3 chromicized catgut (40-day) is passed with the point turned downward through the base of the left broad ligament, then transversely through the anterior wall of the corpus uteri as high as possible without opening the peritoneum; then

through the base of the right broad ligament, again with the needle point down. By making this ligature tense and pushing the detached bladder up, the laterally dislocated edges of the fascia are plainly marked; they are brought together in the middle line by figure-of-eight sutures of catgut No. 3 (40-day), the needle always being inserted from above downward to avoid the ureters. These sutures are usually three or four in number. When they are tied, the orifice through which the bladder prolapsed is firmly closed. The redundant vaginal wall is cut off. The anterior sutures for an amputated cervix are inserted. The cervical sutures are tied. A few transverse sutures unite the anterior vaginal wall over the sutures joining the pelvic fascia.

The posterior vaginal wall and the pelvic floor are strengthened by an extensive Hegar operation as follows: A fold of mucous membrane in the middle line just below the cervix is seized by a hemostat. Two Allis intestinal forceps are fastened to the labia majora a trifle above the original level of the posterior commissure of the vulva. By pulling the centre of the posterior vaginal wall to one side with tissue forceps, it is possible to draw a straight line with a knife from the hemostat to one Allis forceps. The same is done on the other side. The triangle thus marked is partly stripped, partly dissected off. The upper part of the triangle is closed by a double-tier catgut suture, the middle portion by transverse deeply inserted vaginal sutures of silkworm-gut, shotted to facilitate their removal. The perineal body and the lower third of the triangle are united by transverse silkworm-gut perineal sutures, knotted on the external skin surface of the perineum.

DISCUSSION

Dr. J. Wesley Bovée, of Washington, D. C.—So far as Dr. Hirst's paper goes, I am quite in accord with it, but he has not mentioned one of the most important features in connection

with retaining the uterus in proper position, and that is, retaining the cervix in the hollow of the sacrum. He does not do that by his procedure, and that is a very important point. I believe if you retain the cervix in the hollow of the sacrum, particularly a cervix of normal length, you cannot have a prolapse of the uterus, and too little attention is given to the posterior attachment of the cervix uteri. If he amputates the cervix, I should still think he should use the uterosacral ligaments to the best advantage, shortening them as much as possible, and attaching them as far forward as possible on the stumps, not including the canal in the body of the uterus. If I interpreted his remarks correctly, he did not attach so much importance to the posterior part, but placed more emphasis upon the work done upon the vaginal wall. I hope he will touch on that point when he closes the discussion. That is an essential feature in holding the uterus back.

Some Englishman has devised a method of shortening the uterosacral ligaments in cases of displacement of the uterus, backward and downward, which consists of detaching these ligaments from the uterus, denuding the anterior surface of the cervix, carrying the uterosacral ligaments through under the peritoneum, and attaching them to the anterior surface of the cervix. I believe it is a distinct advance in the way of correcting displacements of the uterus. I do not for a moment overlook this work on the vaginal wall, both posteriorly and anteriorly, for prolapsus of the uterus. One has to be cautious, however, not to shorten the anterior vaginal wall. If you do so by shortening it less than two and one-half inches in front of the cervix, you pull the cervix forward which predisposes to a downward and backward displacement.

Dr. G. E. Gavin, of Mobile.—It seems to me, the essayist is only looking at this subject from the standpoint of injuries received during childbirth. My observation and experience have been that at least one-third of the cases of prolapse of the uterus or procidentia I have seen were in girls or in women who have never been married. That fact, it seems to me, would eliminate the theory that this condition is only the result of injury. I must say that I am firmly of the opinion that much of the condition is due to nerve lesions. While it is best relieved by closing up the vaginal outlet as nearly as we can, nevertheless, I do not believe that surgical aid will completely cure all of these conditions.

Dr. George H. Noble, of Atlanta.—The operation described by the essayist is very good as far as it goes, but it does not accomplish enough. It does not provide a means for holding the neck of the uterus backward nor does it prevent retroversion. It does not counteract the additional intra-abdominal pressure that occurs in Douglas' pouch in prolapsed uteri nor prevent slipping forward of the base of the bladder and tendency to cystocele. In other words, no operation for prolapsus, without shortening of the uterosacral ligaments and reduction of Douglas' pouch together with provision against retroversion, will be satisfactory.

The time allotted for discussion is not sufficient to elucidate mechanical principles involved in the process of retrodisplacement and prolapsus of the uterus, to say nothing of the time that would be required to explain mechanical principles of surgical repair of these conditions. I can, therefore, give only a brief outline of some of the more important features.

There is a point in the base of the broad ligament at or below the internal os uteri I call the pivotal point. With the uterus in its normal position, its axis inclining upward and forward, the pivotal point lies in a plane posterior to the centre of gravity of the uterus. Normally the pivotal point is more or less fixed or anchored by three sets of ligaments that converge to a common point on either side of the uterus. Movement of this point laterally is controlled by the broad ligaments, anteriorly by the uterosacral ligaments, and posteriorly by vesico-uterine. In order for it to advance in the direction of the pubic bone, elongation of the uterosacral ligaments and relaxation of the peritoneum posteriorly must occur.

In the process of retroversion, the axis of the uterus changes from the normal to vertical, then backward, and finally more or less horizontal positions, and in passing through these several stages describes a curve and turns upon the pivotal point. The latter advances in the direction of the pubic arch, approaching the line of the centre of gravity of the body of the uterus, and in the latter stages passes anterior to it. The effect is to divert the direction of intra-abdominal pressure. In other words, when the uterus is in normal position, the intra-abdominal pressure (being in all directions) is exercised with the greatest effect upon the fundus and posterior wall, holding the body of the uterus forward and in front of the pivotal point. Coincident with elongation of the posterior uterine supports

the pivotal point passes anterior to the centre of gravity (the latter moving backward) of the uterus causing a reversal of the above condition of affairs. The pressure is changed to the front part of the fundus, anterior wall of the uterus, and the bladder forcing the uterus downward and backward. It will be observed that in the process of retroversion the pivotal point moves forward and Douglas' pouch increases in area in proportion to the extent of elongation of the uterosacral ligaments (Fig. 1). With complete retroversion and dilatation of Douglas' pouch there is an increased area of the latter. For instance, if normally there are ten square inches of surface and the estimated intra-abdominal pressure is four ounces to a square inch it would represent forty ounces of weight or strain placed upon posterior uterine supports. In dilatation of Douglas' pouch the area is increased from two to four times as much, and with it intra-abdominal pressure is increased by reason of the expanse in the area to which it is applied, representing approximately one hundred and sixty ounces (estimated) (*A*, *B*, *C*, *D*, Fig. 1). In addition to this, intra-abdominal pressure is exerted upon the bladder, an area fully as great (Fig. 2). The combined effect is more than the posterior uterine support and broad ligaments can resist. The result is elongation of these supports and the slipping forward of the uterus in successive stages until extrusion occurs.

The mechanical principles in surgical repair indicate a reversal of this process (in addition to correction of lesions of the cervix and floor of the pelvis), that is, turn the fundus forward and move the pivotal point posterior to the centre of gravity of the uterus. This is best accomplished by shortening the uterosacral ligaments, reducing the size of Douglas' pouch, and ligament suspension of the uterus. The former is done with continuous catgut sutures, closing the sides and anterior surface of Douglas' pouch by infolding peritoneum upon itself behind the uterus until the pouch is reduced to normal. The next step, or shortening of the uterosacral ligaments, I have simplified by putting into effect the single suture approximation of three points—one on the posterior surface of the cervix, the other two on either sides of Douglas' pouch at the junction of the posterior and middle third of the uterosacral ligaments. If there is much elongation of ligaments division of them into thirds will not place the suture at the proper point. In such instances it may be introduced about the middle of the posterior

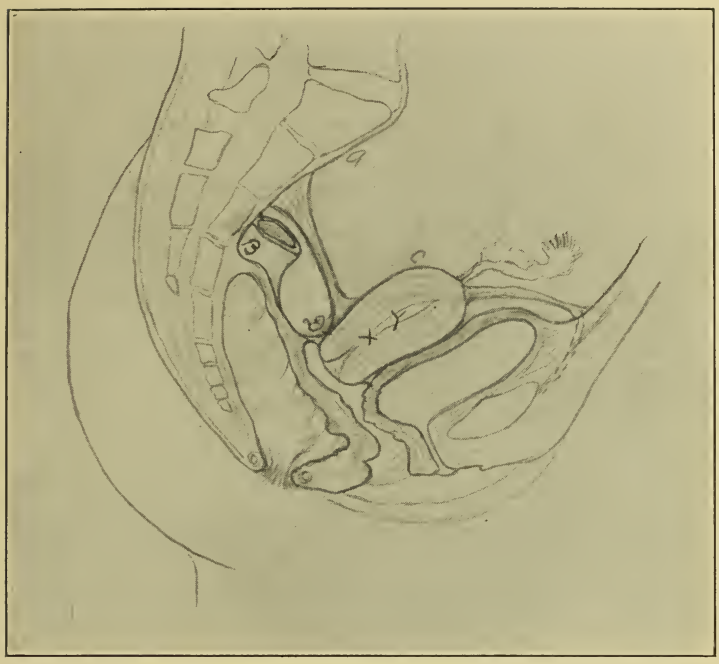

Fig. 1

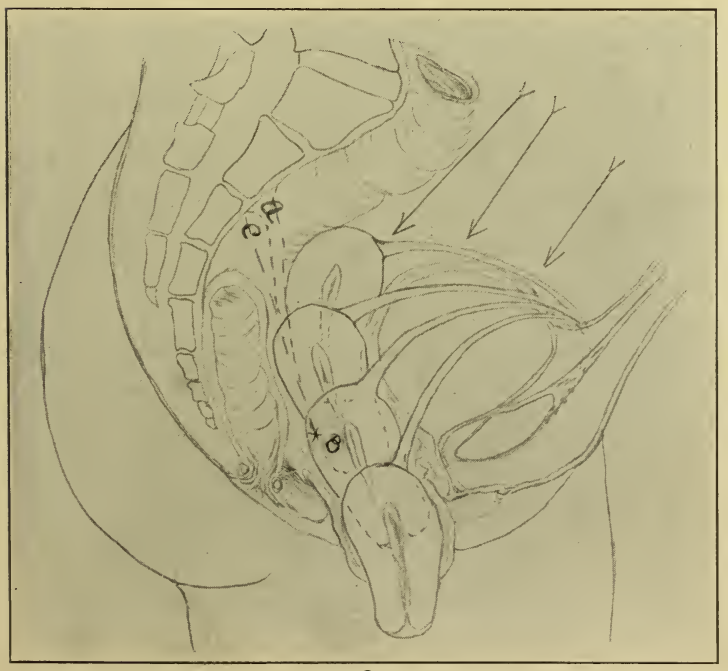

Fig. 2

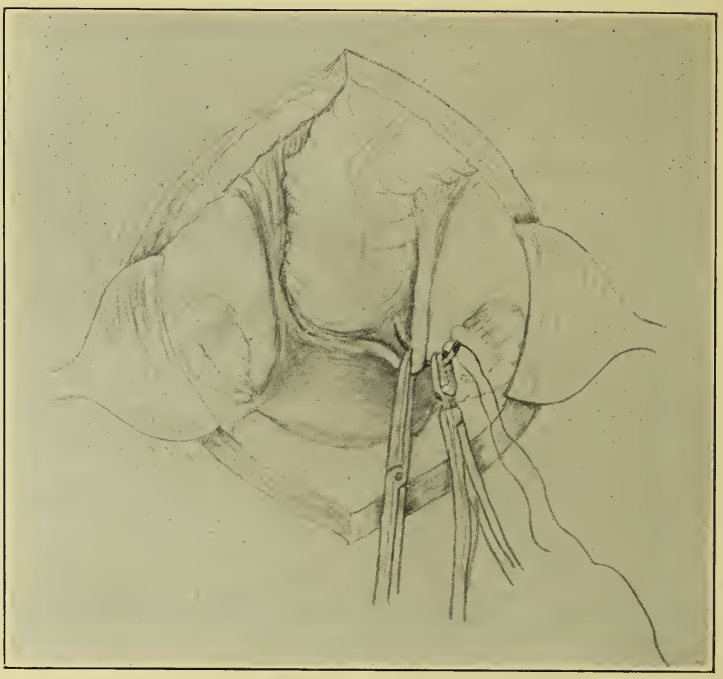

Fig. 3

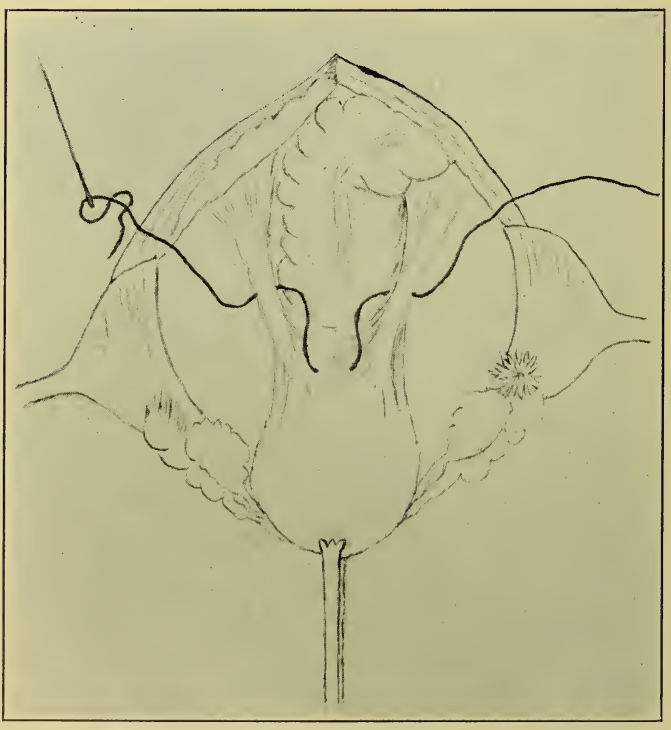

Fig. 4

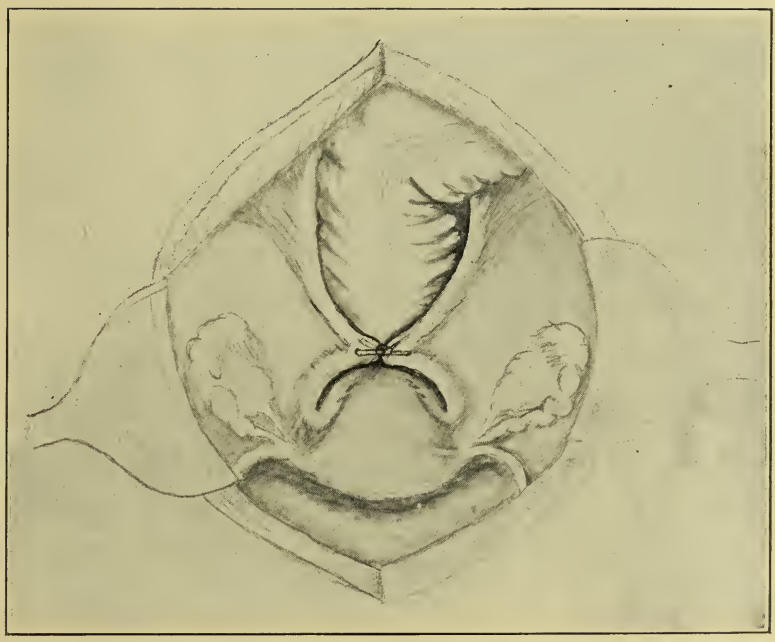

Fig. 5

half of the ligament. In other words, a point should be selected far enough anterior to the sacrum to bring the two ligaments together in front of the rectum in such a way as to produce a normal size retro-uterine pouch. A long pair of forceps picks up the ligaments at the point indicated, and brings it upward as near the abdominal incision as it can be turned to facilitate manipulation. A heavy kangaroo suture in a stout curved needle is passed through the ligaments embracing quite a quantity of tissue[1] (Fig. 3). The ligament is then released, and the needle passed through the posterior wall of the cervix a little below the internal os. The other ligament is then picked up and the needle passed behind it as above described (Fig. 4). In tying the suture, the three points are approximated at a common centre (Fig. 5). The effect is to reduce the size of Douglas' pouch and to pull the cervix uteri backward to its normal position. When there is much prolapsus of the uterus or excessive elongation of the uterosacral ligaments, tying the suture mentioned will cause the anterior part of these ligaments to fall into folds on either side of the cervix at the base of the broad ligament, and if the openings are large enough to admit the finger the folds should be gathered up and one turned over the other (behind the uterus), and each sutured to the opposite uterosacral ligament.

To prevent retroversion the body of the uterus is held forward by shortening the round ligaments. For this purpose I prefer an extraperitoneal operation, embedding the ligaments between the layers of the aponeurosis anterior to the recti muscles.

It will be observed that the principles of this operation oppose the mechanical factor involved in the cause of prolapsus. In the reduction of the size of Douglas' pouch, the enormous weight of intra-abdominal pressure is diverted from that region and is distributed over the posterior surface of the fundus and body of the uterus anterior to the pivotal point. This has a tendency to hold the uterus in its normal position by keeping the centre of gravity anterior to the point mentioned.

Dr. Hirst (closing).—I would say in reply to Dr. Bovée, that he was responsible for my spending the whole of one Christmas holiday in the dissecting room, working on the utero-sacral ligaments on dead bodies; my opinion of the utero-sacral liga-

[1] Retrovesical fascia.

ments is the result of observations made there and on living women with the abdomen open; I became convinced of the inutility of the uterosacral ligaments as supports of the uterus. I do not believe in them as strongly as Dr. Bovée does.

In reply to Dr. Noble; he states positively that no operation for prolapsus of the uterus is satisfactory without shortening the uterosacral ligaments and the round ligaments. With equal positiveness, I will say that this is not necessary. I will guarantee to do hundreds of these operations without utilizing either of these ligaments, and nevertheless get as complete success in the whole series as Dr. Noble would by doing the operation that he has described. Dr. Noble forgets, I imagine, that the strongest support of the uterus is not the uterosacral ligaments or the round ligaments, but the ligaments in the bases of the broad ligament. I utilize them, and therefore employ the strongest support of the uterus in keeping it in place, and have so far done it with uniform success.

THE COLON BACILLUS, A REGULATOR OF POPULATION

By Robert T. Morris, A.M., M.D.
New York

When certain species of animals, like rabbits and lemmings, increase beyond the limit desired by nature in any locality, epidemic diseases suddenly appear, and stop this disturbance of the balance of nature.

In the earlier days of history the human species was subjected to similar epidemics. It seems to have been nature's plan to allow the medical profession to take charge of this subject up to a certain point, but there are limitations which we may not be allowed to pass, because there appears to be a plan to destroy by poison various species of plants and animals, which have arrived at stages of increase or of development beyond nature's liking.

Concerning the stage of development which is to be allowed for man, we can no more anticipate the limit than we can state the reason for the presence of so many thousands of suns in space. We may simply observe the fact that an oak tree is not allowed to grow beyond a certain height, and a rose is not allowed to progress beyond limited stages of development, after which its stamens are transformed into beautiful petals, and the rose then loses its power of reproduction, and falls a ready prey to enemies.

Domesticated animals and man, carried to the higher stages of development, begin shortly to show stigmata of decadence, indicating that nature has been setting its limit.

At the present time there are few individuals among us who do not show some of the stigmata of decadence, even

though no more marked than in irregular development of teeth, or abnormal shape of toes.

Still more striking stigmata are familiar to all of us, as seen in every-day practice in a fair proportion of all of the individuals in a community.

We may assume that glandular structures of the body, engaged in manufacturing protective elements against bacteria, present decadent features, quite as well marked, though not as observable as external anatomical defects. Such decadence of manufacturing organs would mean derangement in function, with a lessening of their protective efficiency. The higher our development, the sooner decadence begins in any one family or group of individuals. Vulnerability to bacteria of various kinds increases. In other words, a poisoning process takes place in plants and in animals when decadence begins. The toxins of bacteria are employed by nature for killing off plants and animals when limitations of development, quite as well as when limitations of increase, have been reached.

Bacteria which formerly caused disastrous epidemics, attacking practically all types of individuals, are under excellent control at the present time, through the resources of preventive medicine. Endemics, like tuberculosis, are controlled to the point where only those individuals who have passed the higher stages of development remain very vulnerable.

There are many bacteria, insidious in their methods of attack, still conducting nature's plan of poisoning off excess of population, and attacking most freely individuals who carry heels of Achilles after passing the higher stages of development in the family.

It is becoming apparent that the colon bacillus group of bacteria stands among the most active malefactors (malefactors from our egotistical point of view, benefactors from nature's standpoint), and this group will perhaps be found to stand next to the tubercle bacillus group in the proportion

of deaths which it causes in a community. It has even been found to extend beyond animal prey, in causing destruction of terminal buds of cocoanut palms.

The reason why the activities of this group of bacteria have not been more quickly recognized is, in general, the reason why the flying machine was not invented earlier, and in special because methods of search for the colon bacillus are of recent development, and not yet extended to cover most of the field. This is, in part, due to the method of work which nature allows us up to the present time. Nature has not even allowed the laboratory clinician to make routine search for the colon bacillus in urine as yet.

At the University we are trained in science to make use of all available data before arriving at a conclusion. Later in life we develop the art of the practice of medicine, and nature sets us at grouping data about theories in a harmonious way to fit our art. This natural antagonism between science and art explains the regulation of progress, which must not be too rapid, according to nature's plan.

In abdominal surgery we all recognize the destructive activity of the colon bacillus when it leads to gangrene of the appendix, but how often do we follow the bacillus from an actively proliferating colony at the appendix, and note distant effects of toxins or of separate colonies which occur synchronously with the development of the colony which is most in evidence?

How often do we recognize the relation of colon bacilli, for instance, to infections in the vicinity of the pylorus and duodenum?

At postmortem examination we find adhesions extremely abundant in the vicinity of the pylorus and duodenum in cases in which the patient has complained during life of nothing more perhaps than dyspepsia. This dyspepsia in itself has not been fatal to the individual, but has been a factor in lessening the resistance of the individual to other infections. The colon bacillus, however, was the original

malefactor, from my present point of view. Such adhesions are mostly overlooked by the medical profession as yet.

The *x*-ray is just rising over the horizon of dyspepsia, but we are already making gastric diagnoses with the *x*-ray, which takes a picture of the stomach filled with bismuth solution, showing interference with motility of the stomach, abnormal peristalsis, or hepatofixation of the stomach, due to adhesions which have apparently resulted from insidious colon bacillus action. Today we depend upon the *x*-rays for dyspepsia diagnosis quite as much as we do for broken bone diagnosis.

Examination of adhesion tissue from the attic of the abdomen by Dr. B. B. Stroud who is making observations for me, shows the presence of the colon bacillus in such tissue, just as others found it encapsuled in gallstones.

It is only recently, however, that we have learned of the activities of the colon bacillus in the gall-bladder.

It seems to me a tenable hypothesis that the colon bacillus is responsible for a large proportion of our cases of ulcer of the stomach and duodenum, such ulcers to my mind simply representing symptoms, like acne of the face. In 1895 I described proliferating endarteritis in the bloodvessels of the appendix. If the colon bacillus causes similar endarteritis of the terminal vessels of the stomach, it would explain why anemic distribution areas of these plugged vessels are exposed to bacterial and digestive destructive attack, resulting in symptoms which become graphic as ulcer.

We have recently noted the fact that the colon bacillus is an agent in production of pancreatitis, but only the acute forms of pancreatitis producing death quickly have as yet attracted our attention acutely. How about the very large group of cases of interstitial pancreatitis not yet noted by the clinician, but which may often result in diabetes mellitus from squeezing out of the islands of Langerhans by hyperplastic connective tissue? Diabetes mellitus, then, like ulcer of the stomach, would belong in classification among

the symptoms of poisoning by the colon bacillus, until we had disproved the point in any given case.

If the colon bacillus is known to cause interstitial pancreatitis, may it not be the chief factor in the development of those cases of hepatic cirrhosis which are known to be of toxic origin, from the influence of intestinal bacteria?

If we already know about pancreatic cirrhosis from the influence of the colon bacillus, and assume that hepatic sclerosis represents a similar infection, should we not think next in order of arteriosclerosis, which causes much shortening of life, as belonging in the colon bacillus class of cases? In arteriosclerosis we have alteration of bloodvessels, including increase of connective tissue, and believed by some to be a result, secondarily at least, of toxic hypertension. A very small proportion of the cases of arteriosclerosis are caused by alcohol and syphilis, the great majority being, perhaps, secondary to saprophytic hypertension. We know that intestinal putrefaction is a forerunner in many arteriosclerosis cases.

When the blood circulatory system is being injured by colon bacillus toxins, we may also have neurasthenia, for these poisons attack the nerves as well as other structures, and neurasthenia is found chiefly in individuals of families who have passed the higher stages of development, and who are prone to intestinal putrefaction.

Indican in the urine is said to be the index of various toxins of intestinal origin, and we know that the colon bacillus is one of the most abundant bacteria which develop out of normal proportion in the bowel of patients who have lost part of their resistance, and whose urine contains indican.

A vicious circle is established when defective protective organs allow the colon bacillus to increase to a point where its toxins produce tissue changes, these tissue changes in themselves giving rise to still further disturbance of function of glands engaged in protection, nutrition, and excretion.

If we are free to assume that the colon bacillus is a male-

factor in arteriosclerosis, we may easily place this bacterium as ranking with the tubercle bacillus in limiting overpopulation by increasing the death rate. The colon bacillus sometimes develops insidiously at various points, when any actively proliferating colony is at work at some one focus and making distant colonies. Thus we may have subphrenic colonies when the primary nest of active bacteria is as far away as in a diverticulum of the sigmoid flexure of the colon. These flagellated bacilli frequently spread over the peritoneum, causing acute peritonitis, when they escape from some focus of destructive activity.

Dr. Charlton, of McGill University, has suggested that pernicious anemia may at times result from colon bacillus infection, but at the present time it seems to me perhaps better to recognize a colon bacillus anemia simulating pernicious anemia.

Malarial infection is simulated by the toxic impression that goes with some forms of intestinal putrefaction, and as the colon bacillus is the commoner saprophyte, it seems fair to assume that the sapremia is to be charged against a bacterium that is dominant at the time. In any event it is evident where the burden of proof lies ready for the clinician.

Dr. H. G. Harris has found the colon bacillus abundant in the urine of a patient with infantile paralysis. We know that experimental injection of the colon bacillus into the circulation has resulted in special impression upon the spinal cord, and that at least makes us pause for a moment to consider what sort of relation may exist between the colon bacillus and infantile paralysis. Perhaps the colon bacillus prepares the way for the special infection of infantile paralysis; perhaps the special infection of infantile paralysis prepares the way for terminal infection by the colon bacillus.

One of the largest group of cases in which the influence of the colon bacillus is daily overlooked by clinicians of the world is in its relation to infections of the kidneys, and this

is particularly regrettable because in no other field perhaps have we such good control of the movements of the colon bacillus.

Dr. William H. Thomson has shown that urotropin (hexamethylendiamin) combined with benzoate of soda, in the course of excretion from the kidneys, is directly destructive to the colon bacillus throughout the urinary tract. Some patients do not split up urotropin into the requisite by-products readily, but the addition of benzoate of soda seems to facilitate the process.

In many cases of infectious and contagious diseases, like scarlatina, measles, typhoid, and diphtheria, the organism found in the urine is the colon bacillus. In several forms of acute gastro-intestinal disturbance, like cholera morbus, particularly in elderly people, the kidneys may be so filled with colon bacilli that a fatal result is due to this complication, which could have been averted by recognition of the colon bacillus in the urine, and application of the Thomson treatment. Persistent bacilluria may require in addition colonic flushing to reduce the primary toxic source.

We have less cause to fear the dangerous nephritis of scarlatina when we find the colon bacillus abundant in the urine, and recognize it as an agent hastening the patient toward death.

Sometimes in consultation physicians have advised against operation in cases of appendicitis because of the presence of albuminuria, but when they were shown the presence of the colon bacillus in the kidneys, they were not surprised at the rapidity with which albuminuria ceased after operation upon the primary focus of infection.

Infection of the urinary tract occurs in several ways. We have ascending infection through the open portal of the urethra, descending infection through the mazes of the blood stream, infection by continuity when the bacilli make their way through tissue from a neighboring focus.

Concerning ascending infection through the open portal

of the urethra—we will often find the colon bacillus as chief malefactor in many cases of chronic cystitis if we simply look for it, and I have found it in cases in which the clinical diagnosis was tuberculosis of the bladder, and a hopeless prognosis had been given. Yet the cystitis disappeared under the influence of hexamethylendiamin before I had taken up the improved treatment of Thomson with the addition of benzoate of soda.

Infection of ureters and the pelvis of the kidney is often due to the colon bacillus, and we may obtain this bacterium from any part of the urinary tract. Some obscure cases in which we suspect the presence of stone in the kidney, but cannot prove it by text-book resources, are really cases in which we will find the colon bacillus at work, if we look for it. This is true also of some kidney abscesses.

The colon bacillus ascends the open portal of the vagina, and is responsible for some of the leucorrheas of intractable character. I have found it chiefly in the ones in which the leucorrhea was secretory in character rather than purulent, and particularly in neurasthenic young women.

This bacterium is sometimes the cause of oviduct infection, when resistance is suddenly lessened in a woman exposed to cold during the time of menstruation.

In other cases the colon bacillus insidiously escapes into the peritoneal cavity beyond the oviducts, without making particular demonstration en route, but attacks an ovary at a point of injury, like that caused by recent escape of an ovum, and gives rise to ovarian abscess. I suspect it to be the cause for some of the ovarian and tubal adhesions in cases giving no history of acute attack.

Incontinence of urine in children is sometimes due to the presence in the bladder of the colon bacillus, which has entered through the urethra, or has descended from the kidney. Highly acid urine caused by the colon bacillus accounts for the irritability of the bladder and the incontinence in this group of cases.

The same bacterium is undoubtedly a factor in limiting population when it goes into the vagina and causes such highly acid secretion that spermatozoa perish, unless we correct the hyperacidity with milk of magnesia, or other resources.

The colon bacillus penetrating the diaphragm sometimes causes local pulmonary consolidation, and it has been found by Kemp as an abundant bacterium in double pneumonia and purulent bronchitis, and obtained in pure culture from the urine at the same time.

The effects of the colon bacillus are sometimes so remote that the influence of this bacterium is not suspected at all. In one case of choroiditis in which the patient had become nearly blind, Dr. Kirkendall, of Ithaca, N. Y., recognizing the toxic character of the choroiditis, sent the patient to Dr. Stockton, of Buffalo, for consultation. Dr. Stockton believed that the toxin in the case might be from the colon bacillus, due to disturbance caused by chronic inflammation of the appendix, and the patient was sent to me for operation. Removal of the appendix cured the patient of his choroiditis.

Clinicians must form a habit of looking for the colon bacillus as systematically as they now make differential blood count.

My view that the colon bacillus ranks along with the tubercle bacillus as an agent for preventing overpopulation and regulating the character of population, by means of poison, might have been given special attention by Darwin or Malthus, had they been in possession of our present data which open such an interesting new vista.

DISCUSSION

Dr. Lewis S. McMurtry, of Louisville.—I do not see how a paper such as Dr. Morris has presented to us can be discussed. It is original and suggestive, like so many of his contributions,

and I rise to express my indebtedness to him for it. It is a thoroughly scientific production, and while the near approach of the hour for adjournment will interfere with its discussion, it will be a valuable contribution to the TRANSACTIONS.

DR. RANDOLPH WINSLOW, of Baltimore.—I merely want to speak of one item that has come to my notice. Dr. Morris mentioned about cocoanut trees being blighted by means of the colon bacillus. There is a young man working in the Agricultural Department in Washington who has discovered a peculiar form of fungus, or a peculiar form of rot in onions which is due to the colon bacillus. His name is Giampietor. He was a student of mine; and he has published his observations in the *Bulletin of the Department of Agriculture.* It seems to me, he has established the fact that this special form of decay of the onion is due to the colon bacillus, so that it verifies the statement of Dr. Morris that the colon bacillus is a very widespread organism, both in animals and in man, and also to a certain extent in vegetable life.

DR. W. P. CARR, of Washington, D. C.—I would like to say that it is not due to any lack of interest that Dr. Morris' paper has not been discussed more than it has. His paper was extremely interesting to most of us, and I am sure we all appreciate it very much.

DR. MORRIS (closing).—The only point I would make is one that occurred at luncheon. Two or three of my professional friends spoke about the intractable bacilluria even when we use hexamethylendiamin and benzoate of soda. In these cases we have to stop putting the bacillus into the hopper. That is the point. We have got to go back to the condition in which we find the bacillus in the urine, from the kidney, and find the source from which it is being dumped into the hopper and stop that. There are many patients with persistent bacilluria in which we can stop this, if subjected to the methods that have been employed by the hydrotherapeutists, namely, colon flushing, and the use of antiseptics and various kinds of treatment about which they know. If we subject these patients to such treatment with a view to prevent intestinal putrefaction, we shall avoid a certain number of end-results caused by the colon bacillus.

BENIGN TUMORS OF THE STOMACH

By Edward A. Balloch, M.D.
Washington, D. C.

Benign growths of the stomach are comparatively rare, yet the aggregate of those reported is large enough to compel us to consider them as factors in the diagnosis of intra-abdominal disease.

All varieties of benign growths have been found in the stomach. There have been reported instances of myoma, lipoma, adenoma, fibroma, myxoma, lymphoma, papilloma, polypus, and cyst. Indeed, one observer reported what he thought was an osteoma of the stomach, but which proved to be cartilage with spicules of bone interspersed.

According to their nature these growths may originate from one or another coat of the organ. They seldom give rise to symptoms unless they project into the stomach or are so situated as to give rise to obstructive symptoms. Naturally, pyloric growths come in the latter category. A small growth in the pyloric region will cause more trouble than a larger one elsewhere in the stomach. For this reason none of the pyloric growths reported has been very large.

The main question of interest in connection with these growths is that of diagnosis. No one reporting a case seems to have made a correct diagnosis. In every instance the growth has been mistaken for something else. With pyloric growths the suspicion has been that the obstructive symptoms were due to malignant degeneration. In the case of growths elsewhere in the stomach they have been referred

to the kidney, the intestines, the omentum, or to the pelvic organs.[1]

Spencer's case well illustrates this point: The patient was a hospital nurse, aged forty-eight years, who had suffered from abdominal troubles for some time. The symptoms were referable partly to the stomach and partly to two movable kidneys. At the first operation he fixed the right kidney and pushed the left one into place. How he expected it to stay there he does not state. The symptoms were not relieved and a second examination showed two reniform tumors, one the left kidney and the other lying over the promontory of the sacrum. This latter tumor had been discovered by Mr. Barling at a previous examination, but had been overlooked by the operator at the first operation. At a second operation he fixed the left kidney and found the second tumor to be in the stomach. He opened the stomach and found it empty, but the mucous membrane on the posterior aspect was rugose and pushed forward. It moved freely over a solid tumor. He split the mucous membrane and shelled out a fibroma weighing 500 grams.

I desire to report two cases of fibroma of the stomach, one a personal case and the other presented through the courtesy of Dr. William A. Jack, Jr.

Dr. Jack's patient was a colored woman, aged sixty-three years, who first entered the Freedmen's Hospital on March, 1910, complaining of an abdominal growth. She was sent to the gynecological ward, where a diagnosis of ovarian cyst was made and operation advised. She refused operation and went home. She returned shortly afterward upon the advice of a physician who had been called to see her during an attack of severe and protracted vomiting. He had made a diagnosis of intestinal obstruction. This

[1] Since reading this paper and after hearing the remarks of Dr. Thompson, I asked the pathologist to again go over this growth. He did so and now reports that it contains myomatous elements and should be classed as a myofibroma.—E. A. B.

time she was sent to the surgical ward and came under the care of Dr. Jack. The points of interest in her history were that the growth was first noticed thirteen years before. There had been occasional vomiting spells, usually from six to twelve months apart. No pain or inconvenience from the tumor. Recently the attacks of vomiting had become more frequent. The tumor had increased in size during the past year and the patient had lost weight, probably because of inability to retain food. Upon examination a tumor was found in the right lower quadrant. The mass was freely movable and could be pushed from the ribs to the pelvis. To the palpating hand it had a fluctuating feel. There was no pain on pressure or on moving the tumor about. Dr. Jack's diagnosis was omental cyst. Operation was done on April 22, 1910. The growth was found to be in the anterior wall of the stomach, involving the muscular coat. It did not project into the stomach. It was easily enucleated. The pathological examination by Dr. Van Sweringen showed it to be a fibroma.

My own case occurred in the person of a woman, aged fifty-six years, unmarried. Family history negative. The only item of interest in the personal history is that she had a severe fall, twenty years ago. In attempting to hang a picture she had placed a chair upon a table. While trying to stand on the chair it slipped and she fell heavily, striking her left side against the edge of the table. The fall was followed by pain and soreness in the left side, which gradually disappeared. For some time she has had vague dyspeptic symptoms, principally pain and nausea. The pain is worse after menstrual periods. In December, 1910, she first noticed an enlargement of the abdomen. This has increased steadily and, at the same time, the pain has grown more severe and more constant.

Upon examination I found a mass in the lower left quadrant of the abdomen. This mass had the general size and shape of a kidney and could be pushed into the left kidney

region without difficulty. When pressure was removed, however, it resumed its original position. With the history of a severe injury to the left side and the presence of a somewhat reniform tumor I was confident that I had to deal with a wandering left kidney, so confident, in fact, that I neglected to examine her as thoroughly as I should have done and sent her to hospital for operation. After she was anesthetized and on the operating table I made a further examination. To my amazement I could push the mass all over the abdominal cavity. It could be made to go into any quadrant and had a wide excursion up and down. Besides, under the anesthetic I could palpate both kidneys in position. After this examination I fancied that I had to do either with a uterine or ovarian growth with a long pedicle or with an omental tumor. At all events I was spared the chagrin of making the usual kidney incision and exposed the growth through a median incision. The tumor presented as soon as the abdomen was opened. It was covered by the omentum and had numerous large bloodvessels coursing over its surface. After separating the omentum the growth was found to come from the greater curvature of the stomach, nearer the cardiac than the pyloric end. The general appearance of the growth was that of a sarcoma. Accordingly, it was excised with a liberal margin of stomach wall all around. The resulting gap in the stomach was sutured and the abdomen closed. Recovery was rapid and uneventful. The dyspeptic symptoms disappeared after the removal of the tumor and she has been in good health since. Dr. Van Sweringen examined this growth also and pronounced it a soft fibroma. His opinion was confirmed by several other pathologists.

These two cases illustrate very well what seems to me to be the main diagnostic criterion in these cases, namely, the great mobility of these growths. When they are attached to the greater curvatures, as many of them are, the range of their excursion is not limited. They can be moved any-

where in the abdomen. This should serve to distinguish them from movable kidney and from pelvic growths. This characteristic is shared, however, by intestinal and omental growths and I know of no sign other than inflation that will enable us to say that a given tumor is gastric rather than intestinal or omental unless perchance the accompanying symptoms should indicate the one rather than the other.

So far as dealing with these growths is concerned, there is nothing particularly difficult in their removal. If one suspected malignancy he would naturally remove a wide area of stomach wall in the effort to get beyond the area of malignancy.

Fenwick and Fenwick, in speaking of fibroma of the stomach wall, say: "We have not been able to find a single case in the whole of the literature where a large fibroid tumor of the gastric wall was above suspicion of malignancy."

I am inclined to share this opinion. Certainly the macroscopic appearance of the growth in my case was that of a sarcoma, and in spite of the favorable report of the pathologist, I shall await the final outcome with interest.

PYLORIC STENOSIS DUE TO OVERGROWTH OF SCAR TISSUE—"GASTRIC KELOIDS"

By W. M. Jordan, M.D.
Birmingham, Alabama

Judging fom my personal experience, non-malignant new-growths in the pyloric end of the stomach are much more common in the negro race than in whites. I have not observed a single case of this character in a white person, but have met with 5 cases in negroes. In one of these a specimen was obtained for microscopic examination, a partial gastrectomy having been performed under the impression that it was cancer. In the remaining 4 the operative procedure consisted of posterior gastrojejunostomy without resection, hence in these no tissue was available for examination. In the first case, in which resection was done, there was a small circumscribed tumor growing from the anterior wall of the stomach close to the pylorus. This tumor projected into the stomach cavity, and was surmounted by the scar of an ulcer. Under the microscope it proved to be a benign growth, consisting largely of fibrous tissue. Its benign nature was further proved by the fact that the patient, a negro woman, aged fifty-five years, was living three and one-half years after operation. This case was the first of the series. In the 4 later cases the operation was undertaken for relief of persistent vomiting due to stenosis. The growths were not so circumscribed as in the first case, but surrounded the pyloric region more or less completely, and extended along the stomach wall to a

distance of one or more inches. In these 4 cases, owing largely to experience gained in the first case, the benign nature of the growths was recognized, and simple posterior gastrojejunostomy was done instead of resection. Hence no tissue was examined microscopically, but the growths closely resembled that of the first case in every respect, except that they were more diffuse and much larger. That they were non-malignant is sufficiently proved by the subsequent histories of the cases. Two were living and free from stomach symptoms one year after operation, and one was in good health after three years. The last case was only operated upon five months ago, and is therefore too recent for conclusions to be drawn from the after-history alone. However, the presumption of non-malignancy in this case is strengthened by the fact that the symptoms of stenosis for relief of which she finally submitted to operation, had existed for four years, to my personal knowledge.

Although there was in each of these cases a definite new-growth which was undoubtedly non-malignant, in none did this growth conform to any recognized type of benign tumor of the stomach. What, then, is the nature of these peculiar growths? One might, perhaps, in answer to this question, think of Brinton's "linitis plastica," or the "stenotic hypertrophic gastritis" of Boas; but I can find little in common between these conditions as described by writers and the one under discussion in this paper. One logical explanation of the cause and nature of these peculiar growths is so obvious as to almost suggest itself. Are they not due to the same racial predisposition that makes the negro subject to fibroid growths elsewhere? The predisposition that is shown, for instance, by the frequency of uterine fibroids in that race, as well as by the marked tendency to the formation of keloids from cutaneous scars?

If I venture to suggest the term "gastric keloid" as descriptive of these growths, I would not wish to be understood as attempting to draw an exact pathological parallel

between the keloid of the skin and the stomach tumors herein described, but rather as undertaking to point out the analogy between the two conditions and to borrow a familiar clinical term to apply to an otherwise nameless condition.

But leaving nomenclature out of the question, there is a fairly close analogy between the common cutaneous keloid and the growths described in this paper. Thus, the skin keloid is known to occur in the negro in an overwhelming percentage of cases, and while a small series cannot be expected to carry conviction in the matter of relative percentage as between the white and black race, nevertheless the fact that even five cases of a supposedly rare condition should have all occurred in negroes, is extremely suggestive. This is more especially true in view of the fact that this race is considerably in the minority in the locality where the cases were observed, and that its members are notoriously slow to seek surgical relief for abdominal disease. Furthermore, the skin keloid almost invariably develops in a cicatrix, and the growths in my cases probably originated in the same way, that is, from the scar of an ulcer. That this was true in one case was shown on inspection of the resected tumor, and the remaining four gave what might be regarded as an ulcer history antedating the onset of symptoms of stenosis.

It will thus be seen that there is a fair basis for the idea of a predisposing racial factor in the causation of this condition. Furthermore, since these growths do not conform to any type of benign tumor of the stomach heretofore described, and are therefore nameless, the term "stomach keloid" might aptly apply until a better one is offered.

If this view of the nature of these growths should prevail, it would, of course, not necessarily mean that they are only to be observed in a predisposed race. On the contrary, the possibility of overgrowth, instead of contraction, of scar tissue at the pylorus in a white person need not be ques-

tioned. In such an event, the peculiar behavior of the scar tissue might be attributed to individual, instead of racial, predisposition. Individual predisposition has not been considered in this paper because, as already stated, no case of this character has been observed by me in any but a member of the black race.

The symptoms produced by these growths are generally those of pyloric obstruction, preceded perhaps by a history of gastric ulcer. The obstruction is produced by the tendency of the tumors to project into the stomach cavity. In none of my cases was there any involvement of the peritoneal surface, and in none did the growth extend beyond the pylorus into the duodenum.

Epigastric pain was the principal symptom in one case, and persistent vomiting in the other four.

The treatment is purely operative, at least after stenosis has developed. Gastrojejunostomy will no doubt be the operation of choice, the more severe resection being unnecessary in most cases. The after-histories of the cases treated by gastrojejunostomy were quite as satisfactory as the one in which a resection was done.

Following is a summary of the case histories:

There were two men and three women, whose ages were respectively twenty-eight, twenty-nine, thirty-eight, forty-five, and fifty-five years. All gave "stomach histories" more or less suggestive of ulcer, preceding the onset of obstruction.

The smallest growth was the one which was resected. It was about one inch in diameter, while the largest was as broad as the hand.

In every case, the tumor was situated to the stomach side of the pylorus. In all but one, the growth merged with the pyloric ring at one end, and presented a sharply defined border at the other.

The peritoneum overlying the growths was apparently normal.

When the stomach was put on the stretch, as in lifting it out of the incision, the gastric wall overlying the tumor assumed a whitish, bloodless appearance, which made it easy to demonstrate the outline of the growth.

In one case the operation was partial gastrectomy, while the other four were treated by posterior gastrojejunostomy. Complete relief was noted in every case.

THE SURGICAL TREATMENT OF CONGENITAL HYPERTROPHIC PYLORIC STENOSIS, WITH REPORT OF A CASE

By G. E. Gavin, M.D.
Mobile, Alabama

I take it for granted, in presenting this paper, that the entire profession, both medical and surgical, is agreed that there is at times a condition of spasmodic stenosis in the adult subject that simulates very closely an organic or mechanical obstruction; yet under medical and dietetic treatment a perfect cure may soon be accomplished; while, on the other hand, we do find real organic lesions existing in the pylorus that can never be cured except by surgical means. In the condition of congenital pyloric stenosis, there may exist two distinct conditions as in adult life, but most likely in nowise dependent upon each other as is the case with the adult. One condition being of simple spasmodic stenosis, the other of real hyperplastic stenosis, hence the latter is a purely surgical condition.

In order to present the surgical side of this subject, we are compelled to refer frequently to the medical side, hence I ask your indulgence for a short time only, in order to reproduce some of the facts and theories concerning the cause, symptoms, and treatment of this most interesting condition, probably found more frequently than one would think, in the newborn. This is a condition with which any physician, at some time or other, is liable to meet, and which he should be able to diagnosticate, being acquainted with

the history of the case and the symptom complex of the disease.

Many theories and conjectures regarding the pathogenesis of this condition, have been adduced, but the real pathology and etiology of the trouble are yet indefinite.

It will be interesting to note and briefly comment upon the three following theories, viz.:

That the spasm of normally developed muscle is alone responsible for the apparent thickening of the pyloric musculature, and for the pyloric obstruction, that there is no real organic stenosis of the pylorus or hypertrophy of its musculature. This theory was advanced by Pfoundler, and has many advocates among pediatrists, who are misled into believing all cases of hypertrophic pyloric stenosis to be merely cases of pyloric spasm and advise against any surgical measures. Postmortem findings, however, show cases of true pyloric hypertrophy, which could have been relieved by proper operative treatment only, thus rendering this theory untenable and, I might say, unfortunate, on account of its misleading influence, causing many conscientious physicians to postpone calling in a surgeon until the vital forces of the infant are too nearly consumed for a successful recovery after such a grave operative procedure as gastro-enterostomy or pyloroplasty.

The second theory, as advocated by Thompson, is that there is a great muscular hypertrophy of the pylorus, which is produced by antecedent overwork, and that this functional abnormality, or spasm, which has occurred before or after birth, is due to a defective development of the nervous apparatus, or to a derangement of the duodenal secretions. As against this theory, it would seem improbable that the amount of spasm or overaction which is necessary to counteract the stimuli from the duodenum, in response to which the pylorus dilates and the stomach contents are emptied, would be sufficient to create the great muscular hypertrophy which characterizes the condition. Furthermore, if the

hypertrophy were due to spasm of the pyloric muscle, it would disappear after gastro-enterostomy, which autopsy findings have disproved.

The third theory to be mentioned, and the one which seems the most plausible, is that there is a primary organic stenosis and muscular hypertrophy, and that this is not due to antecedent muscular overaction, but is purely a faulty embryological development, probably caused by an abnormally high position of the pyloric end of the stomach, resulting in angulation and consequent twisting of the longitudinal fibers, causing a reversion in their growth and development. An excessive connective-tissue hyperplasia is thus produced, which accounts for the partial or complete stenosis of the pylorus.

Defective organic development is as likely to occur in the pylorus as elsewhere, and a primary hypertrophy at this point will excite like clinical phenomena to a functional abnormality or spasm of the pylorus. The symptoms of this condition are constant and are clearly suggestive of an obstruction to the exit of the food from the stomach to the bowels. Vomiting, which characterizes the trouble through its entire course, is, oftentimes, in the beginning only an exaggerated regurgitation; later, however, as the reflex element becomes more accentuated, the vomiting is sudden, forcible, and projectile. It may occur immediately after a feeding, or after several feedings, depending upon the amount of reflex spasm present. There is constipation, with persistent minimal bulk of stool; if the stenosis is complete, there is absence of milk residue in the fecal discharge. There is progressive wasting, marked visible gastric peristalsis and more or less dilatation of the stomach, depending on the duration of the condition. A pyloric tumor is usually palpable; however, not finding the tumor would not signify its absence, as it might be situated under an enlarged liver and not be felt, even with thorough relaxation of the abdominal walls under anesthesia.

The condition has been mistaken for chronic gastric indigestion or marasmus, but in the present light of its definite symptomatology, such a mistake is not probable. A differential diagnosis between hypertrophy of the pylorus and spasm of the pylorus is sometimes very difficult, as the same symptoms may be present in each, differing possibly in degree only; especially is this the case when there is only a partial stenosis. Each condition is accompanied by projectile vomiting, constipation, wasting, visible gastric peristalsis, and, probably, pyloric tumor. In hypertrophy, however, the constipation is more pronounced, there is absence of milk residue in the stools, the vomiting is more persistent and the tumor is long and hard, and does not vary in size from pressure. If no tumor is felt, the diagnosis is in favor of spasm; if it is a breast-fed baby with the above symptoms present, pyloric hypertrophy is the more probable. Dilatation of the stomach is in favor of hypertrophy. If the condition improves under medical and dietetic treatment, spasm is indicated.

The treatment is surgical. No temporizing measures should be advised or approved when once the diagnosis of pyloric hypertrophic stenosis is made. The earlier the operation is done, the less danger there is to life from shock or from want of recuperative force.

The case reported was referred to Dr. McCall, of Mobile, on September 28, 1911. He diagnosticated the condition as hypertrophic pyloric stenosis, and advised immediate surgical intervention. I was called in consultation and concurred in the diagnosis and performed the operation on the same date. The following is the history of the case:

Baby Rhodes, male, white, aged seven weeks, second child, the other child is living and well. Family history was negative. Mother was not sick during pregnancy. It was born at full term; labor was normal; weight, nine pounds. This was the only illness it ever had. It began spitting up its food when two days old, which condition became more

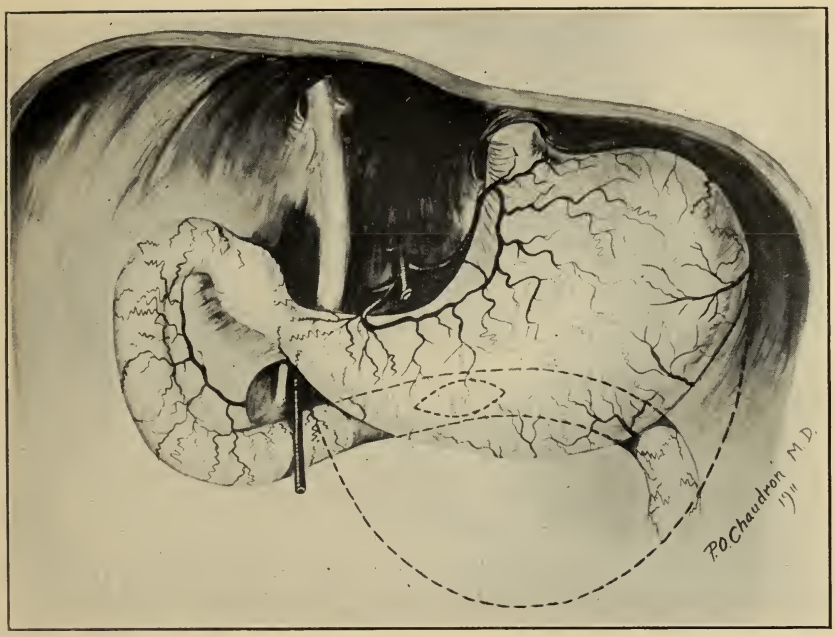

Fig. 1.—Black line indicates extent of dilatation; mass at neck of stomach, apparently in pylorus.

Fig. 2.—Illustrates liver overlapping tumor.

marked until it amounted to distinct vomiting, sometimes after one feeding and sometimes after several feedings. Breast feeding was given three times on the second day and every two hours after that time; barley water, 2 ounces, was occasionally given for a period of eleven days in lieu of the breast-feeding with no abatement of the vomiting. Feeding by mouth was suspended during the time and proctoclysis was given every six hours for two days. A return to nourishment by mouth created a renewal of the vomiting, which was projectile in character, but was not sour. Barley water, which had been given every three hours during the eighteen hours previous to the diagnosis, had been retained. The child was much emaciated, features pinched, and skin of a bronze hue, temperature subnormal, and pulse 140, weight six pounds, five ounces. The liver was two inches below the costal border in the mammary line. The stomach was one inch below the navel. Percussing the left hypochondrium would start a peristaltic wave from left to right as large as a walnut; usually two waves were apparent at the same time. No tumor was palpable. No anesthetic was given on examination for the tumor, as an immediate operation was deemed imperative, and a second anesthesia in so short a time would have been too hazardous. The bowels were constipated, for which a daily enema was given; and which returned dark, bile-stained, and containing shreds of mucus with an absence of milk residue. The operation consisted in a median incision from one inch below the ensiform cartilage to one inch above the umbilicus. After the abdomen was freely opened the stomach presented in a very much dilated condition, the liver overlapping about one-third of the pyloric end of the stomach, thereby showing why no tumor was palpable before operation.

The liver was lifted up and to the right, the stomach drawn up and to the left, exposing to view the tumor, which was very firm and of a lighter color than normal tissue; it was the size of a large pecan and felt as though a

foreign body of an olive shape had been pressed into the duodenum from the stomach. I did a posterior no-loop gastrojejunostomy by the suture method. I had but very little trouble in doing the operation; my only difficulty being the collapsed condition of the intestine, which, in a normal state, is very small. The operation was completed in twenty-five minutes. The patient left the table in about as good condition as before operation. He reacted nicely, and in four hours had a temperature of 103°, pulse 150; vomited quite frequently during the first twenty-four hours. Normal saline, 1 ounce, was given per rectum every three hours for the first two days. One teaspoonful of milk, which was pumped from the mother's breast, was then begun, and was given every three hours with satisfactory results. The milk was then increased to 1 ounce every four hours. The temperature had reached normal by that time and the stools began to show some milk residue. The sutures were removed on the eighth day. The wound healed by first intention. There was nothing worthy of comment from that date until October 9, when it was discharged from the hospital. The child was last seen October 20, a little more than three weeks subsequent to the operation. The stools were regular, and showed the digestion to be normal. The child weighed eight pounds and six ounces, and was apparently in perfect health.

DISCUSSION ON THE PAPERS OF DRS. BALLOCH, JORDAN AND GAVIN.

Dr. James E. Thompson, of Galveston, Texas.—I have listened to the paper on fibroma of the stomach with much interest. I believe firmly that these cases ought to be properly classified as myomata. The literature of benign tumors of the stomach contains frequent references to myoma, but few of cases of fibroma. They are moderately common in man, and veterinary reports make frequent references to them as being quite common in the stomachs of horses.

Three years ago I read a paper on "myoma of the stomach" before this Society and I collected quite a number of cases of myoma and myosarcoma.

I think that the dignity of this Society demands an accurate pathological description and classification of all tumors presented before it.

As regards the paper of Dr. Jordan I hope I may be pardoned if I take serious exception to his comparison between the fibrous growths he described in connection with the pylorus and uterine fibroids which are so common in the colored race. The former is inflammatory in origin, while the latter does not consist of fibrous tissue but is a myoma.

Dr. Felix E. Balbridge, of Huntsville, Alabama.—I would like to ask a question. What does the doctor expect, or what can we expect to become of the tumor after the operation? Is there a possibility of malignancy ensuing after an operation of that kind?

Dr. James E. Moore, of Minneapolis, Minnesota.—In speaking of these tumors of the stomach or tumors of that character occurring in unusual places in the abdomen, it is well to bear in mind the possibility of their being parasitic growths, so to speak, these having been original growths from the uterus, have become attached to other viscera, and later nature makes a separation. Many such cases are on record.

Dr. Balloch (closing the discussion on his part).—Just a word with reference to the remarks made by Dr. Thompson. In this case I was very much of his opinion. I thought strongly at first this was a sarcoma. It looked very much like it, but the pathologist said it was a soft fibroma, and as there were no muscular elements in it I really had difficulty in conceiving how a soft fibroma could occur in that locality. He insisted that he was right, and to verify his opinion he got the opinion of several other pathologists who concurred in the diagnosis. So I, perforce, was obliged to accept it, although strongly of the opinion it was a myofibroma.

I have been very much interested in Dr. Jordan's paper, as I have seen several of these cases, nearly all in negroes. In every case I have seen the ulcer has been the underlying base, the starting point of it, and I must confess it has never occurred to me that there was any more fibrous tissue or chronic inflammatory tissue than would ordinarily be present accompanying a chronic ulcer. Of course, as we know, fibroid processes are

extremely common in the negro. It is probably true, as Dr. Jordan says, that there is more fibrous tissue here than would normally be present with the ordinary pyloric ulcer. Like him, I have never seen these ulcers extend beyond the pylorus. They are all on the gastric side, a few on the duodenal side, and there is an unusual amount of thickening accompanying them, but perhaps no more than ordinarily would be present.

Dr. Jordan (closing the discussion on his part).—I fear that the point I attempted to make was misunderstood by Dr. Thompson. I expressly stated in the paper that it was not my idea to draw a pathological parallel between these growths and anything else. I have been in the habit of speaking of them as stomach keloids, not knowing what else to call them. Such cases are not so very uncommon in the negro race. It was not my purpose at all to claim they were pathologically similar to the fibroid uterus. I should have made that point clearer, but I used that illustration in passing as another instance of susceptibility of this particular race to "fibroid" growths.

As Dr. Balloch has just stated, my personal belief is that every case is due to overgrowth of scar tissue.

Dr. Gavin (closing).—I want to say, gentlemen, that to me the condition I found at this operation was one of the most interesting things I have ever come across in my surgical work, and the most important point about the whole business is, to determine whether this infant was born with the deformity, or whether the condition is really something that develops after it is born, due to a spasmodic irritation and thickening of the pylorus.

In answer to Dr. Balbridge's question as to what becomes of the tumor after operation, I will say that a number of cases are reported in the literature. Murphy reports the postmortem findings of several cases years after this operation had been done, and found that the lesion still existed just as it was when gastro-enterostomy was done. Furthermore, the pathological findings following death when it occurred, have proved that the condition is really a hyperplasia or hypertrophy, and is really not malignant. That to me is what makes it one of the most interesting things with which I have ever come in contact. This growth I found in a child, aged seven weeks, as firm as any cicatricial tissue you ever felt in your life, and about the size of a large pecan, filled the pylorus completely, extended out into the duodenum, occluding absolutely the opening between

the stomach and duodenum. The child had never passed any milk residue from the stomach during its life.

Stillman, Thompson, and a few others have reported cases. The question comes up whether this condition is a congenital deformity or whether it is a condition that develops from constant spasmodic action. Sometimes a tumor shows where you have spasm, but the child will get well under proper feeding and proper nourishment.

HYSTERECTOMY

By R. A. Barr, M.D.
Nashville, Tenn.

The local and general effects of hysterectomy are questions on which we need more light.

The mortality of the operation *per se* is not high enough to be a factor of great determining importance to surgeons or even to patients in making a decision with regard to it.

The destruction of the child-bearing function is a question that can be left to the determination of the interested parties in the individual case. That a woman owes any obligation to God or State that makes it imperative for her to keep this function at the expense of her health and happiness is nothing short of heathenish superstition. This is true even if the function was unimpaired at the time of operation which, of course, is almost inconceivable.

The surgeon's task in advising pelvic surgery is how to select the operative procedure that offers the patient the best chance for restoration to health.

Before the surgical status of hysterectomy can be determined definitely it is necessary to find what effect the removal of the womb alone, or of the womb and ovaries, will have upon the female organism.

It is more than possible that the importance of the uterus as the source of symptoms in pelvic disease in general and particularly in gonorrheal infections has been overlooked. My own belief on this subject is widely at variance with that held by most surgeons and so is my opinion of the importance of retrodeviations of the uterus in causing

symptoms. It is not my intention to inflict you with my theories on these subjects, however.

However frequently the uterus is the source of trouble, and however futile plastic and suspensory surgery may be for its relief, the question of the local and constitutional effects of hysterectomy must come up for serious consideration before it can be advised.

In order to get information on these effects for my own guidance I have sent to my hysterectomized patients a list of questions to be answered by them. It was my intention to get their own ideas with regard to the effect of the operation. No doctors were consulted, and the information obtained was to be direct, and not modified by cross-examination. In several instances this resulted in the patient getting the idea that I believed I had made a mistake in doing the operation. Some of them were disturbed to find that there could be a doubt at all about the absolute desirability of the procedure. I am sure that I got the worst possible view of the situation, though one or two surmised that I would not be averse to a little flattery mixed with the answers. The extreme reluctance of women to make a written statement about such an operation was clearly demonstrated for great difficulty was experienced in getting even 50 per cent. of answers. In several instances husbands refused to allow their wives to reply. If I had sent the questions through the family doctors, I am sure I would have gotten a larger per cent. of replies, but probably not such a frank statement of opinion.

Thinking that the information obtained might have some value to others I have tried to get some of it in shape to present here. A great many of the operations were done on negroes. Most of these cannot be located. The same is true of white clinic cases. Those who can be located are too ignorant or too indifferent to make answer. Of my private work the only part of which I have consecutive satisfactory record has been done since November 1, 1907.

This private work done between November 1, 1907 and December 1, 1910, a period of three years and one month closing a year ago will probably serve best for presentation since they are consecutive cases and represent the best class of my work, those most likely to get severe reaction.

Since the uterus has not yet been given credit for having an internal secretion, most surgeons remove it when no ovarian tissue can be left to keep it company. On the other hand, probably the majority of surgeons leave in sound ovaries when the uterus is removed before the menopause. Such experience as I have had has led me to follow the majority in the first instance and join in the minority report in the second. I have uniformly for some years removed the uterus and ovaries together, and this report covers no case in which ovarian tissue was left.

Of this series of 85 hysterectomies two (Nos. 19 and 35 in order of operation) died within seventy-two hours after operation from streptococcus infection, and one (No. 23) died ten weeks after operation from chronic infection and fecal fistula. Three patients (Nos. 7, 12 and 65) have died from recurrence of uterine cancer. Of the remaining 79, 23 answered none of the questions, leaving 56 to serve as a basis of this report.

Thirty-five had supra-vaginal amputation done; 21 were pan-hysterectomies by the abdominal route; 19 were unmarried at the time of operation (3 of these have married since); 37 were married at the time of operation or had been.

The principal pathology was: Uterine fibroid, 17 cases; pelvic infection, 23 cases; uterine cancer, 6 cases; double ovarian cysts, 4 cases; indefinite pathology, 5 cases; hemorrhage (unexplained), 1 case.

The cases in which the pathology was termed indefinite had no demonstrable specific infection. All had more or less ptosis, great pelvic tenderness, large ovaries with multiple small cysts, and all but one had large flabby uterus with

cervical lacerations. All of these cases were intensely neurotic.

The average age of the 56 patients was thirty-five and one-half years.

The questions asked were as follows:

1. What was the condition of your general health before operation?
2. How has your general health been since operation?
3. What was the condition of your nervous system before operation?
4. What is the condition of your nervous system now?
5. Have you had hot flashes since operation?
6. Do you still have hot flashes?
7. Did you have pelvic pain and soreness before operation?
8. What is your present condition in regard to pelvic pain?
9. What change have you noticed in your sexual nature?
10. Have you failed in a general way to get relief from operation?
11. Have you developed any trouble that you attribute to the operation?
12. What reasons have you for regretting the operation?

To summarize from this table we find that 47 are now in reasonably good general health, and that their condition is as good or better than before operation. No. 6 was in bad health before operation and has been worse since. No. 14 was in fairly good health (she had just passed through an attack of generalized peritonitis of pelvic origin) and is worse. No. 25 was in very bad health and is little better. Nos. 31, 33, 50, and 74 were in poor health and are no better. Nos. 71 and 75 who were in poor health before operation do not answer as to present condition.

As regards the condition of the nervous system 42 are in as good shape as before operation, though some of them are still nervous. The majority of these are greatly improved. Thirteen state that there has been no improvement, and some of them are worse off in this regard than before opera-

tion. No. 6 for instance was bad before and is worse. No. 14 says her nervous condition was good before operation and is now in bad shape. No. 17 was very bad before and is still bad. This, however, has not prevented her from being happily married. No. 25, bad before and worse. Nos. 31, 42, 43, 50, 75, and 78 were bad and are about the same. Nos. 53, 59, and 60 were in pretty good shape beforehand, but have deteriorated. No. 64 did not answer this question.

Forty-nine suffered with hot flashes early after operation. Eight of them, however, only to a slight extent. No. 37 (forty-four years old) and No. 52 (twenty-six years old) emphasize the severity. More recently 35 of them have improved, most of them greatly. In 11 they have entirely disappeared. Nos. 6, 31, and 78 who suffered early did not answer this for recent. The average age of 11 who are no better in this regard is almost thirty-six years.

Of the 49 who had pelvic pain and soreness before operation, 34 have been entirely free of it since. Nine are greatly improved, and 4 (Nos. 14, 33, 50, and 60) are unimproved. Two (Nos. 71 and 75) who had pelvic pain before the operation do not state their present condition. No. 25 had no pelvic pain before but has had great pain since.

With regard to change of a sexual nature 39 made answer. Thirty-two state that they have noticed no change. Two (Nos. 5 and 57) have changed for the better. No. 49 is a little less passionate. No. 11 and No. 26 say they have noticed very little change. No. 16 has diminished desire due to vaginitis. No. 25 has lost what little desire she ever had.

Forty-seven patients state that they secured relief from the operation. Two did not answer the question. Of the other seven, No. 14 got only partial relief. No. 25 is better in some ways and worse in others. No. 31 got no relief in any way. No. 33 failed to get relief and so did No. 42. No. 50 got great relief for six months then had a recurrence of cancer. No. 74 still suffers with colic.

The following patients had trouble following operation and attributed by them to it. No. 3, inflammation of nerves due to incompetent nursing. No. 6 has a hernia. No. 14 has an obstruction on the right side of the vagina. No. 18 is getting fat. No. 24 has severe headaches. No. 25 has bad eyesight, pain in eyes and top of head, nervousness and loss of patience. Nos. 29 and 69 had bladder irritation. No. 33 has tender scar. No. 42 has bladder irritation and growth of hair on face and body. No. 50 had recurrent cancer. No. 52 has pain in back and shortness of breath. No. 56 had tender wound. No. 64 had bad feeling around heart, and No. 70 is nervous.

Forty-five patients state that they have no reason for regretting the operation. No. 6 regrets on account of hernia. No. 14, because operation is a failure. No. 16, on account of vaginitis. No. 17 wants children. No. 25 for every possible reason. No. 31 has given up hope of being well. No. 32 sometimes feels that she is different from other women. No. 33 only regrets the expense. No. 42 was not relieved and is growing whiskers. No. 50 only regrets the recurrence of cancer. No. 60 regrets that the surgeon overlooked hemorrhoids.

In a summary of bad results 25 patients have some complaint to make about the operation.

The pathology in these 25 cases was:

	Cases.	Total.
Uterine fibroid	6	17
Infection	11	23
Cancer	3	6
Indefinite pathology	4	5
Dermoids	1	4

	Total.
22 were married	37
4 unmarried	19

The average age of these 25 patients is approximately thirty-six and one-half years.

Now that the statement of the patients has been put plainly before you, I feel that a word of explanation with regard to some of the cases may not be out of place.

No. 3 states that she had inflammation of the nerves following her operation. She was almost insane at the time of operation, and seemed to have a delusion with regard to neglect on the part of the nurses.

No. 6 says her general health and nervous system have suffered detriment, and that she has a hernia. She changed surgeons soon after operation, but I saw her recently on the street. She must weigh in the neighborhood of 200 pounds and seems quite active for her weight and disabilities.

No. 14 was a wreck before operation and is still one, though she is beginning to improve. She developed a cystic swelling on the right side of the vagina, doubtless a peritoneal cyst framed in a pocket made in closing the broad ligament. She is unmarried but this obstruction causes her great uneasiness.

No. 16 complains of vaginitis. Her husband has had an acute gonorrhea since she was operated.

No. 24 is troubled with hot flashes and headaches. She is unmarried and only twenty-three years old, but her general condition has improved greatly.

No. 25 is another who beforehand was a nervous and physical wreck and who has been greatly disappointed in the results of her operation. Her husband says that she has improved in every way, and recently she admitted as much to me in conversation.

Nos. 29 and 69 had temporary irritation of the bladder following panhysterectomy for cancer. Both yielded promptly to treatment.

No. 31 is another genital derelict who should have had months of treatment following operation in a sanitarium for nervous diseases.

No. 33. Very similar to 31.

No. 42 was the subject of pelvic infection for years before

operation. The hair she complains of is no newgrowth, as you can readily understand. I saw her quite recently. She has gained twenty pounds since the operation, and has not been to see her family physician for a year.

No. 50 was a bad case of cancer with prompt recurrence.

No. 74 got relief from her pelvic symptoms but had an intestinal trouble not relieved by operation.

No. 75 was bedridden for months before operation. She came perilously near losing her life at operation, and had vaginal and abdominal sinuses following it that have only recently healed, as she refused to let any one give them the least attention.

No. 78 was frankly insane at the time of operation. I have heard that she is completely restored in that regard, but give these facts as bearing on the value of her testimony.

Of one thing I am convinced: hysterectomy cannot give a woman a new nervous system, and prolonged careful after treatment in the hands of a competent internist is essential in many cases requiring this operation. Unfortunately none of my cases have had this. They have all left the hospital as soon as they made an operative recovery, and none of them have had supervision so far as I know.

DISCUSSION

Dr. Herman J. Boldt, of New York City.—It is obvious to everyone that Dr. Barr has made a very painstaking investigation as to the results of such a serious operation as hysterectomy is for a woman.

We may classify surgeons who do operations of this kind into three kinds, namely, those who invariably do a radical operation, that is, removing everything that is in the pelvis, those who are overconservative, and those who use their judgment in doing as much as in their opinion is absolutely necessary.

In the consideration of what should be done for a patient, I do not believe there is any hesitancy if a patient suffers from carcinoma, or if the patient has a myomatous tumor, in remov-

ing or enucleating it. It may become necessary to remove everything except the ovaries. In operating upon patients who have inflammatory disease of specific origin, such as gonorrheal infection, or in many instances of puerperal infection of long standing, it requires much judgment. We must take into consideration the age of these patients. If the patient is young upon whom we intend to operate, and there is any part of the adnexa present that should be retained, or can be retained, it seems to me, it is desirable to invariably do a conservative operation to such extent as is consistent with the condition. If, however, it is evident from the pathological condition that presents itself to us that we cannot possibly save the adnexa, save an ovary or any part thereof, I see no earthly use in considering the saving of the uterus. In that class of patients it is desirable and frequently necessary to remove the pelvic organs *in toto* in order to bring about a complete cure.

Dr. W. P. Carr, of Washington, D. C.—What Dr. Boldt says is undoubtedly true. A very important point in cases of this kind was brought out by the reader of the paper, and that is, these operations do not cure the patients of everything they have. Patients ought to understand that when they are operated on they may be cured of the disease for which they consulted us, besides putting them in a better condition to be cured of other troubles. If they understand clearly that operation does not cure them of everything, but that they may need the treatment of a competent internist for quite a long period afterward, the operation putting them in a position whereby they can be cured, there will be much less complaint and dissatisfaction. This is important, and has not been emphasized as much as it should be. We ought to see that patients are carefully cared for after operations when they need it. There may be cases, of course, where the surgical condition is the only thing, and a properly performed operation will effect a cure at once, but these are comparatively rare. It is not so much the manner of operating or how much is taken away as it is what the patients expect. If they expect to be cured in two or three months time by the operation alone, they will be disappointed in many instances. If they know that an operation is to put them in a condition where they can be cured, then they do not expect so much of it, and they are better satisfied with the results, and the results will be better if they are carefully attended to afterward. The answers to questions of this

kind from patients will depend very much upon how patients happen to feel the day they reply to your letter. If they are not feeling well, if it is possible they have a headache or a pain in the stomach, you will get an unsatisfactory answer. I shall never forget one woman upon whom I operated, who wrote me every two weeks after the operation to the effect: "Doctor, I suffer very much from headache; I have pain in my back; I have dyspepsia so badly that I hardly know what to do." This woman would enumerate everything anybody could possibly have in her letter, but she would invariably wind up by saying, "But I feel so much better since the operation you performed on me that I hope and pray to God that you will continue in your good work."

Dr. Guy Leroy Hunner, of Baltimore.—I do not think we distinguish clearly enough between pelvic inflammatory conditions in considering pelvic operations of this radical type that the doctor spoke of. Gonorrheal inflammatory conditions ought to be placed in a class by themselves when we are considering the question whether to operate at all, or when we are considering what the prognosis may be in a given patient.

In 1903 it was shown by Krönig and Menge that we should be more conservative in advising operations for gonorrheal inflammatory conditions. These gentlemen called to mind a fact so familiar to all who have given careful attention to patients, namely, that if you operate for a gonorrheal pus tube and remove the tube and leave the ovaries and uterus the patient will too often come back and insist on having the ovaries removed because of pain at the menstrual period. Later these patients will come back and insist on having the uterus removed if it has been left. After that operation, they come back still complaining of tenderness of the pelvic tissues. Now, the lesson to be drawn from this is, if we can avoid operation at all under these conditions, we ought to do so, and it is the experience of those who have had most to do with these infections that nature takes about as good care of gonorrheal conditions as can the surgeon. If we operate at all, we should not make a definite prognosis, for in these gonorrheal cases we are apt to have tender pelvic tissues, and a tender abdominal scar, so that the desired result is not obtained.

Dr. Barr (closing).—I am thoroughly in accord with what Dr. Boldt has said. In regard to gonorrheal infections, we should try every possible means of alleviation of suffering

before operation is done, and I believe many of these cases can be put in reasonably good condition without operation. I have considered ten years a reasonably long time to wait for gonorrheal conditions in order for the patients to get satisfactory relief. If they do not at the end of that time, I advise surgical treatment.

Dr. Boldt said we should be as conservative as possible. I believe that is the course that every man will pursue who does conscientious surgery. We all try to do the most conservative work we can, but in some cases it is very difficult to decide at operation what is the conservative thing to do.

THE INDICATIONS FOR ABDOMINAL CESAREAN SECTION IN ECLAMPSIA

REPORT OF FOUR CASES

By John F. Moran, M.D.
Washington, D. C.

Eclampsia is the *bete noir* of obstetrics. Its unknown cause and origin have given rise to endless speculation and great diversity of opinion regarding the treatment. While the source and nature of the disease are still unsolved, our knowledge of its pathology, supporting the toxin theory, has, in recent years, been greatly augmented, and the writer believes that its demonstrated progressive nature clearly emphasizes the necessity of prompt emptying of the uterus, particularly after the onset of the convulsions. It is impossible to tell in a given case the amount of damage, but there is no question that repeated seizures is a compelling indication for immediate action. What the method of intervention shall be, must be determined, primarily, by the condition of the cervix and the anatomical and physiological changes which the uterus undergoes during pregnancy and labor. In the primipara the cervical canal is closed throughout pregnancy, while in the multipara the internal os may be closed, the external is patulous. In the early months of gestation, in the primipara, owing to the increasing intra-uterine tension on account of the intermittent contractions of the uterus and the resistance of the cervical barrier, the passive lower segment is formed, and at or just

prior to labor the forces are also exerted upon the internal os, which gradually unfolds until complete dilatation is effected. In the multipara, however, because of the relaxed condition of the uterus the intra-uterine pressure is not so great, so that there is little effacement of the internal os during labor, and in dilating, the cervical canal assumes rather a tubular form, unlike that of the primipara, which is conical. Therefore, in primipara with the cervix intact, os undilated, and the life of the mother or child menaced, vaginal or abdominal Cesarean section, depending upon the period of gestation, are rational methods of delivery. The writer is well aware that this view is not shared by those who oppose elective intervention in eclampsia, but experience and study has thoroughly convinced him that these operations are not only justifiable, but in some instances imperative. Those who have to deal with eclampsia know that manual and instrumental dilatation of the cervix are attended with grave, immediate, and remote dangers. Forcible dilatation, or more correctly speaking, *divulsion* of the cervix aggravates the eclamptic seizures, causes shock, deep cervical tears are not infrequent, and hemorrhage and infection often complicate the situation. These remarks apply particularly to primiparæ with intact cervices and to multiparæ with like condition, who have never been delivered by the vagina, and in cases of unyielding rigidity of the cervix, due to scar tissue, and also where immediate delivery is indicated in the interest of the mother or child. Of course the writer does not wish to be understood as advocating the classical and vaginal Cesarean sections to the exclusion of the other methods of intervention in eclampsia, as he recognizes that the cutting operations have a well-defined but limited field of application. In accordance with this view, the writer desires to report the following cases.

Case I.—M. I., primipara, aged twenty-four years. Eight months' gestation. Seen in consultation with Drs. Gill and Stone. Admitted to Sibley Hospital June 6, 1911, 11 a.m.

Had two convulsions before being removed to the hospital. Examination by Drs. Stone and Gill: Deep coma, stertorous breathing; pulse, 132. Cervix intact, os undilated. Fetal heart distinctly heard over the left lower quadrant of the abdomen. At 12.45 P.M. examined by Drs. Stone and Moran: Labor in abeyance, fetal heart weak and coma more profound than on previous examination. Cervix intact. Cesarean section was elected with the hope of saving the mother and child. Operation performed by Dr. Stone assisted by Drs. Gill and Moran. Placenta was attached to anterior wall of the uterus. Baby delivered; cyanosed and toxic, and twenty minutes elapsed before the breathing became regular. A few minutes after delivery the infant had a convulsion and seizures recurred at intervals for twenty-four hours. Weighed 5 pounds. Was placed in an improvised incubator and had to be fed artificially. Thrived very well the first four weeks, during which time it was cared for in the hospital. Died two weeks after removal of marasmus.

CASE II.—Three successful Cesarean sections for eclampsia in three successive pregnancies of the same patient, performed by Dr. W. P. Carr. The writer saw this unique case in consultation with Dr. G. Lloyd Magruder at the beginning of the ninth month of pregnancy in the last pregnancy. At that time there was a trace of albumin in the urine, but no other clinical manifestations of impending eclampsia were present, so it was decided to let the pregnancy continue.

Mrs. D., primipara; married; white. First operation, October 25, 1907. Dr. Carr was summoned to Sibley Hospital in great hurry by Drs. Barker and Suddarth. The patient was unconscious and labor had only begun about an hour before. Woman was too fat for vaginal work of any kind. Abdominal section elected. Not a single convulsion after the operation. Patient made a good recovery, and left the hospital on the fourteenth day. Child living.

Became pregnant about one month after leaving the hospital, and aborted accidentally about the fourth month.

Second operation, March 11, 1909. Practically same condition as at the first operation. Convulsions began with the first pain. Ceased promptly after operation. Easy recovery. Child large, healthy, and still living.

Third operation, November 8, 1910. Patient had been treated by Dr. Magruder for several months with view of preventing eclampsia. With the advent of labor convulsive seizures began. At the operation adhesions found between omentum and abdominal wall all along line of incision. Good recovery. Child living.

When Halbertsma, in 1890, at the International Medical Congress at Berlin, advocated Cesarean section as the universal remedy for eclampsia without regard to medical treatment, the announcement created a sensation. His experience, based only upon 3 cases, the first performed in 1878, with a fatal result, was surely not calculated to inspire one with enthusiasm for the operation. Ten years later, with improved technique, Cesarean in general was attended with better prognosis, and he performed the operation in his second and third cases with the happy result of saving both mothers and infants.

In 1907, Kellitz (Inaugural Dissertation, Halle) collected 28 cases of Cesarean section for eclampsia. Fourteen mothers died (50 per cent.) and 18 infants were stillborn or succumbed shortly after birth (62 per cent.). In 9 cases there were other indications for the operation (contracted pelvis, myoma, etc.). If these be excepted the mortality is more favorable (47.3 per cent.).

Streckeisen (*Arch. f. Gyn.*, Berlin, 1903, xlviii, 678 to 729) collected 28 cases. Twenty-six were operated on from 1897 to 1901. Two were operated on by Schatz (1888-1892), and were not reported by Kellitz. Twenty-six of the cases were living and 2 were dead at the time of the operation. Twelve of the mothers died (42.8 per cent.). Nine infants were dead or died shortly after birth (31 per cent.).

Hillman (*Monatsschr. f. Geburts. u. Gynäk.*, Berlin, 1899,

x, 193 to 207) reviewed 39 cases and reported 1 operated on by himself. All but 7 are given either in Kellitz's or Streckeisen's series. Of the 7 cases 5 mothers died (71 per cent.); 3 infants were born alive, 1 was stillborn, and 2 are not mentioned.

The writer has collected 53 cases of Cesarean section for eclampsia from 1901 up to the present time. Seventeen mothers died (32.32 per cent.); 45 infants were born alive, 7 were stillborn, and in 4 cases the result is not mentioned.

Altogether 116 cases have been recorded in the literature, with a maternal mortality of 48.93 per cent., and of infants 39 per cent. respectively, or more than double the general maternal death rate of eclampsia. At first glance this is not a convincing argument in favor of Cesarean section in eclampsia, but the final analysis shows that a very large percentage of the patients had been previously subjected to other methods of treatment, many of whom were practically moribund, before the operation was resorted to. Yet if we compare the above series we find that the results during the last decade are very encouraging, and that the death rate for the mothers has been reduced to 32.32 per cent., and 19.9 per cent. for the infants. This steady improvement in the statistics has been due, in a great measure, to better technique, greater care in the selection of the cases, and prompt intervention. Certainly, with the knowledge gained and wider experience, it is reasonable to expect that the mortality will, in appropriate cases, be still further reduced by elective Cesarean section.

This paper is, therefore, offered in advocacy of vaginal and abdominal Cesarean section, in certain cases of eclampsia, as valuable and rational operations. If they are to have an established place in the treatment of eclampsia the indications for which they are urged must be met by prompt elective action, for to delay until the patient is *in extremis* and all other treatment has failed is to invite disaster.

Literature

No 1.—Lowenstein, H. *Centralbl. f. Gynäkologie,* Leipzig, 1902, xxvi, 117 to 120.

Case 1 (1899-1890).—X, aged twenty-eight years, primipara; not in labor; cervix intact, os undilated; term; frequent convulsions; Cesarean section; no previous treatment; mother died seventh day after operation; child lived.

Case 2 (1901).—X, aged (?), primipara; not in labor; cervix intact, os admits finger; beginning of the ninth month; frequent convulsions; Cesarean section; morphine and chloroform; previous treatment; convulsions continued after operation; mother died of edema of the lungs; child lived.

Case 3 (1901).—X, age (?), primipara; seventh month of gestation; cervix intact; frequent convulsions; Cesarean section; previous treatment morphine and hot air baths; did not react after operation, and died in coma; child stillborn.

No. 2.—Van Gueard. *Centralbl. f. Gynäkologie,* Leipzig, 1902, xxvi, 1326 to 1329.

Case 4.—X, aged twenty-five years; primipara; convulsions and coma; eighth month of gestation; cervix intact, os closed; Cesarean section; previous treatment, morphine, salt solution, hot air baths, etc.; mother died in coma; child stillborn.

No. 3.—Skeel. *American Gynecology,* Baltimore, Md., 1903, iii, 502 to 510.

Case 5.—X, aged nineteen years; primipara; seventh month of gestation; convulsions; Cesarean section; previous treatment, morphine, chloroform, veratrum viride, venesection, etc.; mother living; child dead.

No. 4.—Sir. H. Croom. *Trans. Edinb. Obstet. Soc.,* 1903-04, xxix, 194 to 209.

Case 6.—X, convulsions. Cervix intact; Cesarean section; previous treatment, hot baths, chloroform, instrumental dilatation, etc.; mother died; condition of infant not stated.

Case 7.—Eclampsia; mother died third day after Cesarean section of septic pneumonia; child lived.

No. 5.—Wanner. *Centralbl f. Gynäkologie,* Leipsiz, 1904, xxviii, 13339 to 13341.

Case 8.—X, aged twenty-seven years; primipara; eight and one-half months gestation; convulsions; previous treatment, morphine; Cesarean section; died of edema of the lungs twenty-four hours after operation; child lived.

No. 6.—Boldt. *Post Graduate,* New York, 1905, xx, 1251 to 1267.

Case 9.—E. H., aged twelve years; primipara; convulsions and contracted pelvis; Cesarean section; convulsions after operation; mother died of edema of the lungs; child lived.

No. 7.—Woodbury. *New York Medical Journal,* 1905, lxxxvii, 999 to 1001.

Case 10.—X, aged twenty-five years; primipara; twenty-five convulsions before operation; previous treatment, manual dilatation, chloroform, high forceps, etc.; mother died of infection on the eighth day after operation; condition of child not given.

No. 8.—P. S. Klots.—*Transvaal Med. Jour.,* Johannesburg, 1906-07, ii, 160 to 163.

Case 11.—X, aged nineteen years; primipara; convulsions; cervix intact, os closed; morphine ineffectual; Cesarean section; had several convulsions after operation; mother recovered; child lived.

No. 9.—Lundblad. *Hygiea,* Stockholm, 1907, 2f, 7, 714 to 722.

Case 12.—X, aged forty years; primipara; convulsions; cervix intact; Cesarean section; mother recovered; child (?).

Case 13.—X, aged twenty-six years; primipara; child died.

Case 14.—X, aged twenty-two years; primipara; child premature; Cesarean section; mother and child recovered.

No. 10.—Rotter. *Pest. Med. Chir. Presse,* Budapest, 1907, li, 194 to 195.

Case 15.—X, aged twenty-six years; primipara; frequent convulsions and deep coma; edema of face and extremities; Cesarean section; had several convulsions after operation, necessitating the administration of morphine and salt solution; mother recovered; child lived.

No. 11.—Pfannenstiel. *Münch. med. Woch.,* 1908, 552, 1903.

Case 16.—X, Cesarean section performed in a case of eclampsia because frequent convulsions, edema of the lungs, and the failure of the general measures; mother recovered; child lived.

No. 12.—Tompkins. *Old Dominion Jour. of Med. and Surg.,* Richmond, 1908, vii, 25 to 27.

Case 17.—X, aged forty-three years; primipara; seven months' gestation. Repeated convulsions; cervix long, hard, and os closed. Cesarean section; one convulsion after operation; mother recovered; child living.

No. 13.—Markoe. *Bull. Lying-in Hospital,* New York., 1900 ii, 5.

Case 18.—X, aged twenty-four years; primipara; had three convulsions before operation; previous treatment, chloroform; convulsions after Cesarean section; mother died; child lived.

No. 14.—S. H. Johnson. *Northwest Medicine,* Seattle, 1908, vi, 149 to 151.

Case 20.—X, aged nineteen years; primipara; eight months' gestation; convulsions; coma; cervix closed; Cesarean section; mother recovered; child lived.

No. 15.—W. Smith. *Jour. Amer. Med. Assoc.,* 1906, xlvi, 1355.

Case 21.—X, aged twenty-one years; multipara; typhoid fever complicated the first pregnancy and aborted at the fifth month; second pregnancy, forceps delivery; child mutilated; third pregnancy com-

plicated by eclampsia; Cesarean section; mother recovered; child lived two and one-half hours and died of convulsions.

No. 16.—Mullally. TRANS. SOUTH. SURG. AND GYN. ASSOC., 1909, Phila., 1910.

Case 22.—X, six months' gestation; cervix intact; convulsions before and after operation; previous attempt to dilate the cervix; mother died; child stillborn.

Case 23.—X, convulsions before and after delivery; Cesarean section the only treatment; mother recovered; child stillborn.

No. 17.—A. J. Risseuw. *Nederländsch. Tijdschrift voor Geneeskunde*, 1910, Heft 14.

Case 24.—X, primipara; cervix intact; convulsions; Cesarean section; mother recovered; child died two hours after birth.

Case 25.—X, primipara; cervix intact; convulsions; Cesarean section; mother recovered; child died.

Case 26.—X, primipara; cervix intact; convulsions; Cesarean section; Mother recovered; child recovered.

Case 27.—X, primipara; cervix intact; convulsions; Cesarean section; mother recovered; child (?).

Elective operation was performed in the above 4 cases.

No. 18.—Schell. *Jour. Indiana. State Med. Assoc.*, 1910, iii, 16 to 20.

Case 28.—X, primipara; seven months' gestation; convulsions; labor not begun; manual dilatation failed; Cesarean section; mother recovered; child living.

No. 19.—McCann. *Lancet*, London, 1910, ii, 789 to 792.

Case 29.—X, aged twenty-six years; cervix elongated and rigid; morphine and chloroform administered; unsuccessful attempt made to dilate the cervix instrumentally and manually; recurring convulsions prompted Cesarean section; mother recovered; child stillborn.

No. 20.—Burns. *Colorado Medicine*, 1911, viii, 183 to 184.

Case 30.—Mrs. F., aged thirty-one years; primipara; frequent convulsions; bleeding from the cervix on attempted dilatation; Cesarean section; mother recovered; condition of child not mentioned.

No. 21.—Metzler. *Med. Weekbl.*, Amsterdam, 1911, xvii, 565.

Case 31.—X, cervix intact; frequent convulsions; chloroform administered and attempt made to dilate the cervix without effect; Cesarean section performed; mother recovered; child lived.

No. 22.—Davis. *Surgery, Gynecology, and Obstetrics*, Chicago, 1911, xiii, 406.

Case 32.—X, primipara; not in labor; eclampsia; nine and one-half months; Cesarean section; mother recovered; child lived.

Case 33.—X, primipara; not in labor; eclampsia; full term; justo-minor pelvis; Cesarean section; mother lived; child lived.

Case 34.—X, primipara; eclampsia; nine and one-half months; not in labor; twins; Cesarean section; mother died on table; twins lived.

Case 35.—X, primipara; A. P. eclampsia; Cesarean section; mother recovered; child lived.

Case 36.—X, primipara; not in labor; eclampsia, eight and one-half months; mother died second day; child died twenty-third day.

Case 37.—X, multipara; not in labor; rigid cervix; eclampsia; Cesarean section; mother lived; child lived.

Case 38.—X, primipara; eclampsia; no sigh of fetal life; twins; Cesarean section; mother lived; stillbirths.

Case 39.—X, primipara; eclampsia, seventh month; not in labor; Cesarean section; mother recovered; child lived.

Case 40.—X, primipara; eclampsia, eighth month; not in labor; Cesarean section; mother recovered; child lived.

Case 41.—X, primipara; eclampsia, eighth month; not in labor; Cesarean section; mother recovered; child lived.

Case 42.—X, primipara; eclampsia, eighth month; not in labor; Cesarean section; mother died first day; suppression of urine and repeated convulsions; child lived.

No. 23.—W. P. Carr. Washington, D.C.

Case 43.—Mrs. D. (first operation October 25, 1907), primipara; ninth month gestation; in labor; intrapartal convulsions; cervix intact; Cesarean section; not other treatment; mother recovered; child lived.

Case 44.—Mrs. D. (second operation, March 11, 1909); multipara; ninth month; in labor; intrapartal convulsions; cervix intact; Cesarean section; no other treatment; mother recovered; child lived.

Case 45.—Mrs. D. (third operation, November 8, 1910); multipara; ninth month; in labor; intrapartal convulsions; cervix intact; Cesarean section; no other treatment; mother recovered; child lived.

No. 24.—I. S. Stone, Washington, D.C.

Case 46.—Mrs. L., aged twenty-four years; primipara; eighth month; not in labor; frequent convulsions; cervix intact; Cesarean section; no other treatment; mother recovered; child lived.

No. 25.—Coen. *Bolletina della Societa Toseana et Ostetricia et Ginecologia*, 1902, v, 84.

Case 47.—X., aged thirty years; primipara; recurring convulsions; Cesarean section; fourth day evidence of infection; anti-strepticoccus serum administered; died on tenth day; child lived.

No. 26.—Essen-Mollier. *Hygiea*, Stockholm, 1904, 2f, liv, 705 to 708.

Case 48.—H. L., aged twenty-two years; primipara; repeated convulsions and coma; Cesarean section; mother died; child (?).

No. 27.—N. J. Sevryugoff. *J. Akust, i jensk. bodiez.*, St. Petersb., 1909, xxiii, 1007-1014.

Case 49.—X, aged thirty years; primipara; frequent convulsions; in labor; full term; previous treatment, morphine, chloroform, and salt solution per rectum. Cesarean section performed at patient's home; mother recovered; child lived.

Case 50.—X, aged thirty-four years; frequent convulsions; cervix intact; canal not dilated; child's heart action weak; Cesarean section; morphine and salt solution after the operation; convalescence without incident; child lived.

No. 28.—A. J. H. Kramer. *Nederl. Tydschr. u. Geneesk.*, Amsterdam., 1904, 2 v., 40, d, 2 833 to 835.

Case 51.—X, repeated convulsions; cervix intact; morphine given; Cesarean section; mother recovered; child lived.

No. 29.—G. H. Kemper, reporter. *Jour. Ind. State Med. Assoc.*, 1911, iv, 170. Dr. Budd van Swerigen, operator.

Case 52.—X, aged thirty years; eclampsia; Cesarean section; mother died; child lived five hours.

Ibid.—C. Richard Schaefer, operator, p. 151, Case, 53.

Case 53.—X, aged twenty-seven years; primipara; eight and one-half months' gestation. General anasarca and almost complete anuria; tachycardia and intermittent pulse; Cesarean section; mother recovered; child lived.

DISCUSSION

Dr. E. Gustav Zinke, of Cincinnati.—We are here to ascertain the truth, as nearly as possible, with regard to all things medical and surgical. I hope that Dr. Moran will not deem me unfriendly if I criticise his paper adversely. I am prompted only by a sense of duty, and speak solely in behalf of suffering womankind.

When several years ago Cesarean section was advocated for eclampsia, I wondered whether it would stand and whether the profession at large would accept it. When some time previous to this I strongly recommended Cesarean section for placenta prævia and found no support, I was equally astonished. Today I marvel why so many continue to perform Cesarean section for eclampsia, and why so few are willing to admit the justification of Cesarean section in cases of placenta prævia. I have nothing to say of placenta prævia today, and wish simply to discuss the paper presented by Dr. Moran. I am opposed to Cesarean section as routine treatment for eclampsia. I have serious doubts as to its justification in any case of eclampsia. If a man must perform an operation for eclampsia, it is, perhaps, the proper procedure; but so long as Cesarean section is still an operation not free from danger, and as long as we have other means by which the convulsions may be controlled in the vast majority of cases, just so long will I oppose abdominal or vaginal hysterotomy as the only treatment for this terrible obstetric complication. Cesarean section involves the opening of the abdominal as well as the uterine cavity, and as we can never entirely eliminate the danger of sepsis in any case, and as there are other methods far more reliable and less

injurious, with which the convulsions may be controlled, Cesarean section is an after not a first consideration. Surgery has contributed nothing to the reduction of the mortality, maternal as well as fetal, in puerperal eclampsia. Because a certain number of cases, treated by Cesarean section, have recovered from the convulsions, is no proof they would not have recovered without Cesarean section. There are plenty of cases on record where patients have had fifty, seventy-five, and many more attacks, and which terminated in spontaneous delivery of the child and recovery of the mother; and this sometimes without treatment, and sometimes in spite of the treatment that was instituted.

The proper treatment for eclampsia is *to treat the convulsions and let pregnancy alone.* There is no remedy equal to Norwood's tincture of veratrum viride, if promptly and properly used, and in the management of puerperal convulsions.

Five days ago I was called to see a case of puerperal convulsions in consultation. The patient was a young primipara who had had three convulsions, one every hour. I told the doctor to give her an injection of twenty drops of veratrum viride. He did so. She had no more convulsive seizures after that, and delivered herself of a living child the following day. This is not my only experience. I reported all of my cases a year ago last September to the American Association of Obstetricians and Gynecologists. Since 1903 I have used nothing in these cases except veratrum viride, and I have yet to see the first fatal case.

We must not forget the pathology of eclampsia. The convulsions are not always of the same origin. In the majority of cases the convulsions are due to kidney insufficiency; in a few others the cause may be acute yellow atrophy of the liver, and, again, the convulsions may be due to apoplexy. Convulsions resulting from acute yellow atrophy of the liver are always fatal, those due to apoplexy end in death, as a rule; if not, recovery is incomplete. Cesarean section cannot save these cases. It is for this reason that I reject all surgical interference, except where the patient is in labor and the os sufficiently dilated to permit the use of the forceps. Cesarean section either vaginal or abdominal, in my opinion, is not justifiable in the treatment of puerperal eclampsia. The same may be said of decapsulation of the kidneys and other heroic surgical procedures.

Dr. Robert S. Hill, of Montgomery, Alabama.—There are many subjects that have and will come before this meeting, but, in my opinion, there is not one that is of more practical importance than the one now occupying our attention. I am very much gratified to see the position the essayist has taken, because I have felt for several years that Cesarean section was entitled to a place in the treatment of not only eclampsia but placenta prævia that it does not occupy. If a patient is removed from hospital advantages, then veratrum viride, which was first used by Dr. Baker, of Eufaula, Alabama, for eclampsia, is one of the best things I know of to control the convulsions, and I agree with Dr. Zinke, that it should be freely administered. However, if the patient can be carried to a hospital I am inclined to advocate, yes, even before the convulsion occurs in certain cases, Cesarean section. I prefer the abdominal route because when we recall that about 75 per cent. of the cases of eclampsia occur in the primiparæ we must appreciate that the Duhrsen or lower Cesarean section for this condition is a difficult procedure in the majority of cases, which is not true of the abdominal operation; indeed, abdominal Cesarean section is quite an easy operation, and is not within itself dangerous. There are those who tell us that a large percentage of our patients subjected to this operation die from sepsis and that, therefore, the operation should not be done. Infection is usually due to a failure to carry out the principles of cleanliness in making examinations before the operation is done. Bad results following these dirty examinations should not be charged to the operation of Cesarean section. Our colleges must give more attention to the teaching of obstetrics—must teach the men who are to do the majority of the obstetrical work to observe the same rules of cleanliness that the surgeon observes. When this is done, the cause of infection will be removed and, then, Cesarean section will, I am confident, occupy an important place in the treatment of eclampsia.

Dr. Henry D. Fry, of Washington, D. C.—I do not want the impression to go out from this association that we recommend abdominal Cesarean section for eclampsia without raising a protesting voice. I agree with Dr. Moran in what he says, that we do not know the etiology of eclampsia, and that the best thing to do to save a woman's life is to empty the uterus as soon as possible. We do not know how far the lesion in the liver, hemorrhagic hepatitis, is progressing, whether it

has passed the reparative stage, or will continue after the woman is delivered. I think abdominal Cesarean section should not be considered for one minute, because we have vaginal Cesarean section which is so much better. If a woman with eclampsia has a contracted pelvis complicating it, then it is perfectly right to do abdominal Cesarean section; but with a woman having normal pelvic measurements and eclampsia, vaginal Cesarean section will deliver her with less danger and less mortality, as the best results we have obtained from a large number of cases collected have been from immediate delivery by vaginal Cesarean section, this mortality being about 5 or 6 per cent. in some reports. Now, the objection to abdominal Cesarean section is, in the first place, you cannot always save the life of the child. Forty per cent. of these children are either born dead or they are toxemic and are going to die within a week or two after delivery. You are doing abdominal Cesarean section on a toxemic woman, and the result would not be as good as in a clean case. You go through the peritoneal cavity and the uterine cavity when you can do it just as quickly and just as well without exposing the woman to these dangers by doing a vaginal Cesarean section. Take a primipara, who has been mentioned here, with cervix of full length and an indurated condition, you can by vaginal Cesarean section open that up by a clean cut, dilate the uterus, and deliver the child in five or six minutes, and not subject the woman to the alternative operation, that is, abdominal Cesarean section, and I heartily disagree with Dr. Zinke that surgery has done no good to reduce the maternal mortality of eclampsia. I say surgery has. The best result that can be shown by any method of treatment is by vaginal Cesarean section and prompt delivery.

Dr. Walter B. Dorsett, of St. Louis.—I have done eight Cesarean sections, but I have never done a Cesarean section by the abdominal route for eclampsia, because I do not believe that it has a place in the treatment of this disease. Aside from acute yellow atrophy of the liver, we must not forget the fact that we have a toxic condition; that we have toxins in the blood, and therefore the old-fashioned way of treating these cases by blood-letting, I believe, still has a place, so much so that I have in the last four or five years done a number of these blood-letting operations in which I have infused into the veins the same amount of normal salt solution that I took from

the veins. This is done for the purpose of diluting the toxins, and in order to get the kidneys to act; so that the use of veratrum viride in the dose indicated by Dr. Zinke, and vaginal Cesarean section (not abdominal), and the blood-letting with the infusion of normal salt solution, I believe, is the best treatment. It is the treatment I have followed.

I have had charge of a large charity hospital in which we had, on an average, one baby a day for each year for five years. I have had considerable experience, and I believe I can speak from his experience by saying that I have lost but three cases from puerperal eclampsia, and in the last few years since I have been using normal salt solution in these cases I have lost none.

Dr. William D. Haggard, of Nashville.—I want to mention a class of cases in which I think abdominal Cesarean section is particularly indicated, namely, those primiparæ who are at term but not in labor, and who are seized with puerperal eclampsia. It is a notorious fact that these are the most difficult cases to handle, and I do not see any objection whatsoever, if proper surgical surroundings can be obtained, to subjecting these patients to Cesarean section. It is the quickest, shortest, surest, and best means of delivery. If Dr. Fry is correct, and I believe he is, and the majority of the professional world will support him in his attitude of immediate delivery in these cases, abdominal section is the quickest way, much quicker than vaginal Cesarean section, and I think the great majority of men can do it much better and much more easily. I have had three cases of this type in which I was able to save the lives of the three mothers and the three children. The operation, when indicated, is one of the easiest in abdominal surgery, and it seems to me it is the best surgery to employ this form of operation when it is indicated, as I have mentioned. Any other operation will not give such results in this particular class of cases.

There may be some discussion about multiparæ and patients who are septic, who should not be operated on. Delivery is the *sine qua non,* although our distinguished and venerable friend, Dr. Zinke, now holds the opposite view, but to take the words out of his own mouth, he recently said: "If the symptoms are very threatening, and the medical treatment does not afford prompt amelioration, the uterus should be emptied;" and I would hold him to that view. An extremely larger percentage of these patients are going to die whether veratrum viride is

given or not, because we know that the mortality of these cases, as reported by McPherson, is 38 per cent.

Accouchement force and high forceps and version are more dangerous, inflicting much more trauma than abdominal Cesarean section, and I believe the future will prove that contention.

Dr. Zinke.—Cesarean section for puerperal eclampsia will not be advocated in ten years from now. We have absolutely no assurance that, after a patient has been delivered, the convulsions will cease. They continue after labor in many cases.

Dr. Moran (closing).—Differences of opinion stimulate progress, and for that reason I am very glad to have heard what Dr. Zinke has had to say, also Dr. Dorsett and Dr. Fry. Since we do not know the cause of eclampsia, and since we know its pathology is progressive, it is the universally accepted opinion, or nearly so, that immediate emptying of the uterus is the indication in eclampsia, particularly after the onset of convulsions. As Dr. Fry has said, we do not know just how far the pathological condition may have progressed at the time of the first convulsion, and the sooner we empty the uterus, the sooner the convulsions will cease in at least from 50 to 75 per cent. of the cases. A large percentage of these women go on to recovery, and that is the rational indication to proceed at once to empty the uterus.

As I stated, I did not offer Cesarean section as a panacea for eclampsia. I said that it has a definite but limited field. Where the cervix is intact—eclampsia occurs in primiparæ in 75 per cent. of the cases—it seems to me that a clean-cut incision, doing an elective abdominal Cesarean section when you have passed from the eighth month up to term, is to be preferred to *divulsion* of the cervix and the forcible removal of the child either by version or by an instrument.

I would take issue with Dr. Fry, who opposes abdominal Cesarean section and is in favor of vaginal Cesarean section, if a cutting operation is elected. If you do vaginal Cesarean section at term, you still have the vaginal route to complicate the case, even granting you have the normal measurements of the pelvis or approaching them. You have got to determine the relative proportion between the size of the passenger and the passage. So I would limit vaginal Cesarean section to the cases from the eighth month or from any period of gestation

up to the eighth month. After that I would elect to do abdominal Cesarean section.

We in this city are proud of our statistics of vaginal Cesarean section. We have had 25 cases with 2 deaths, and 1 of the cases was abandoned by the operator who was not familiar with the technique.

Dr. Fry is wrong in stating that the mortality of vaginal Cesarean section is only 5 or 6 per cent. The statistics recently collected and published by Peterson show that in 520 or 530 cases there were 124 deaths, or 23 per cent. mortality. He does not take the statistics of two or three operators and put them forth as the general mortality of the operation. If we compare the records of the last decade, since Kellitz's contributions, we find that there has been a gradual decline in the mortality in abdominal Cesarean section for eclampsia all over the world. If we analyze these cases we will find that in many of them an elective Cesarean section was performed. The operation was done promptly; no medication was given whatever, and many of the bad cases that have died were subjected to other lines of treatment, both medical and instrumental, and more particularly to *divulsion* of the cervix. The latter operation ought to be relegated to the obstetrical limbo—at least should not be done in hospital practice. Most of these cases come to the general practitioner. Forcible dilatation of the cervix will continue in vogue, in general practice, but when these patients get into a hospital, under proper environment, I am sure that accouchement force will be a thing of the past. I am firmly convinced, notwithstanding what Dr. Zinke has said, that the next decade will show a lower death rate than the past, and I hope by the next decade we will have reached a knowledge of the cause of the disease and be able to deal with it in a rational and scientific manner, but until that time comes I am satisfied the cutting operations will have a well-deserved place in the treatment of eclampsia.

THE LANE OPERATION: THE INDICATIONS FOR AND THE LIMITATIONS OF THE PROCEDURE WITH A DISCUSSION OF THE PRINCIPLES UNDERLYING IT

By John Young Brown, M.D.
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"In the legacy acquired by man from his animal ancestors, there occur not only rudimentary organs that are useless, but fully developed organs equally useless. The large intestine must be regarded as one of the organs possessed by man and yet harmful to his health and life."

While this statement of Metchnikoff has not been fully accepted, his writings have, nevertheless, succeeded in stimulating many to investigate this organ, with the result that much knowledge has recently been acquired concerning its anatomy, physiology, and pathology. That the normal cecum and colon can be removed without any impairment to the general health of the individual has been abundantly known.

In 1909, E. W. Groves, writing on the colon in relation to colic exclusion, submits certain facts regarding the anatomy and physiology of the colon as obtained from the study of three cases and arrives at certain conclusions, among them being the following:

1. That the absorption of foodstuffs in the colon is so slight as to be negligible.

2. That therefore the greater part of the large intestine is functionally unnecessary.

3. That, as the contents of the colon consists of nearly one-third part by weight of bacteria, the absorption of soluble bacterial products probably occur in all cases of colic stagnation.

During the last eight years, the writer has had an opportunity to study the effects of complete exclusion of the large bowel in six cases. In one case, that of a youth, aged fourteen years, operated on for an intussusception three and one-half years before I saw him, the operation resulting in an artificial anus situated ten inches above the ileocecal valve, with quite a large prolapse of ileum; the large bowel was completely out of commission for three and one-half years. The boy enjoying excellent health during this time, suffering no inconvenience, and seeking relief only because of the annoying discharge of fecal matter which continually bathed his abdomen.

A second case sent to me from Hot Springs, Ark., had a condition almost identical with the one above described. She had been the victim of two operations for what causes I was unable to determine. When seen by me, a large opening in the ileum was found which was fixed in the old abdominal scar. All of her fecal matter had been discharged through this opening for a period of fourteen months. With the exception of an occasional discharge of mucus from the rectum, her large bowel had been entirely inactive during this period. Her general health was perfect and she sought relief solely on account of her inability to keep herself clean.

A third case in which the entire large bowel was suddenly put out of commission, as the result of a strangulated umbilical hernia and in which we subsequently did an end-to-end anastomosis of ileum to sigmoid, has remained in perfect health during the nine years elapsing since the operation.

Mummery, in his 1910 book on *Diseases of the Colon,*

says that one of the most important functions of the colon is to prevent loss of water from the body so that by means of the absorption of water from the intestinal contents which occurs in the colon, the body is protected against loss of fluid that would otherwise occur. He adds: "In cases where for the relief of some diseased condition a right inguinal colotomy has been performed so that the dejecta escape at the termination of the ileum instead of by first passing through the colon. The patient always suffers from thirst and it is quite obvious that a great waste of body fluid is occurring."

The writer's experience does not bear out this statement. Quite recently, in the case of a woman suffering from an advanced and inoperable malignancy of the rectum, a right inguinal colotomy was performed, the ileum being cut across six inches above the ileocecal valve, and both proximal and distal ends fixed in the wound. The patient showed no symptoms of thirst or evidence of great loss of body fluid, following this procedure, but, on the contrary, improved greatly and remained in comfort until a few weeks before her death, which occurred six months later as the result of her malignancy.

The fact that one can live without the large bowel is no argument, however, that its removal should be undertaken or that the normal fecal current should be switched, unless there can be demonstrated undoubted pathological conditions, bringing about internal stasis, justifying such a procedure.

Sir Wm. Macewen aptly says: "With all his alleged imperfections, normal man is a much more perfect animal than the physiologist or surgeon can make him. Human effort toward the repair and perfecting of normal man has hitherto been poor compared with nature."

There are, however, pathological conditions which seriously interfere with the normal function of the large bowel and which can be relieved by properly applied surgical measures.

In 1853 Virchow called attention to the frequent finding at autopsy of areas of localized peritoneal adhesions narrowing the lumen of the large bowel and expressed surprise that this condition had aroused so little interest.

Glenard, in 1887, expressed as his belief that the constipation associated with enteroptosis was due to kinks in the colon. In 1901, Mr. Arbuthnot Lane, of England, in a series of papers, discussed at length the mechanics of the large bowel and described "acquired mesenteries" and adhesions which he does not regard as evidence of inflammation, but attributes their cause to an effort on the part of nature to oppose the downward displacement of viscera "the tendency to which exists whenever the erect posture is assumed."

Jackson, in 1909, in a classical paper on membranous pericolitis, describes the pathology pointed out by Lane, but makes no mention of the ileal kink. The pathology above outlined gives a definite and characteristic symptomatology which consists of malaise, backache, headache, anorexia, eructation of gas, nausea, vomiting, loss of weight and muscular tone, obstinate constipation, with occasional attacks of diarrhea. Nearly all of these patients have failed to improve under prolonged medical cure. Many of them have been subjected to needless operations and they seek surgical relief as a last resort. In all such cases a careful analytical diagnosis is essential. The bismuth meal with the twenty-four or forty-eight hour interrupted fluoroscopic examinations, in connection with the symptomatology and physical findings will demonstrate conclusively the existence of intestinal stasis. If Mr. Lane is correct in his views that these pericolic adhesions are due to a compensatory process, the mere division of adhesions will not suffice to relieve these cases. On the contrary, it would seem that this procedure would be undoing nature's efforts toward the accomplishment of cure. Exclusion of the colon and ileum seem to meet the indications. Of course, in addition to

Fig. 1.—Showing huge artificial anus situated eight inches above the ileocecal valve. Prolapse of the intussuscepted ileum.

Fig. 2.—Same patient, six weeks after operation.

this, it is necessary to correct any other intra-abdominal conditions that may be present.

During the last three years, the writer has operated on 16 carefully selected cases of this type. In all of these cases a diagnosis has been arrived at by a process of exclusion, and in each intestinal stasis has been demonstrated by means of the bismuth meal prior to operation.

A long incision through the right rectus sufficient for general exploratory purposes has been made. The ileum has been divided six inches above the ileocecal valve and both proximal and distal ends closed, a lateral anastomosis then being made between the ileum and sigmoid. Prior to this a general exploration of the abdomen has been made and such work done as the individual pathology would indicate. Of the 16 cases operated on, 14 presented well-defined, pericolic membranes, and in all there was present kinking of the ileum. In 2 of the cases the condition found at operation was undoubtedly due to primary involvements of the appendix. In 9 of these cases, the constipation and the symptoms of intestinal toxemia have been entirely relieved, the patients gaining in weight and showing marked general improvement. In 5 of the 14 cases, while the improvement has been satisfactory, much annoyance has resulted from gaseous distention and pain in the excluded cecum and colon. These are the type of cases in which Mr. Lane advocates a secondary operation, which operation should consist of the removal of the colon down to the sigmoid. (See Fig. 2.)

McKenzie, of Portland, in a recent article in the *Annals of Surgery,* advocates that instead of this extensive surgical procedure a cecostomy be done. He reports several cases in which the symptoms above described have been relieved entirely by this simple procedure. This operation appeals to the writer quite strongly, as it can be done without difficulty or danger and in view of the fact that the fecal current has been completely turned, no annoyance would

follow from this small opening in the cecum, as there would be no fecal drainage therefrom.

In conclusion it cannot be too strongly emphasized that neither the Lane operation nor any of the suspension operations should be undertaken unless there is present well-defined demonstrable pathologic lesions justifying their performance. All so-called atonic and neurasthenic types of enteroptosis will yield far better results if given proper rest, hygienic and dietetic treatment.

References

Metchnikoff. The Nature of Man.

E. W. H. Groves. On the Functions of the Colon in Relation to Colic Exclusion. Proc. Royal Society of Medicine, London, 1908 to 1909, vol. ii, Surg. Sec., p. 121.

P. L. Mummery. Diseases of the Colon and their Surgical Treatment, p. 13. New York, Wm. Wood & Co., 1910.

Sir Wm. Macewen. The Function of the Cecum and Appendix. Lancet, London, October 8, 1904.

Virchow. In 1853, Archives, vol. cclxxxi.

Jackson. Membranous Pericolitis. Surgery, Gynecology and Obstetrics, September, 1909, p. 278.

DISCUSSION

Dr. R. C. Coffey, of Portland, Oregon.—We all remember the time when we very frequently removed ovaries with the belief that we would do no harm in removing them. I remember that time very well. I think we can all say today that that was the greatest crime ever committed in the name of surgery. It was an ignorant crime; it was an accident, we may say. We also remember the time when we threw aside the gall-bladder as worthless, and when it was quite the rule to remove the gall-bladder, and some surgeons removed the gall-bladder in preference to doing a cholecystostomy. That time and that practice have largely passed away, and there are few men who are removing gall-bladders today if they feel that they can be saved. The question is whether we can improve upon nature.

I had the honor of reporting the first case of this kind that

was ever reported in this country, in 1906, in the *Journal of the American Medical Association,* before I heard of the Lane operation for ulcer of the large intestine. I removed the colon fifteen months afterward, because gas and fecal matter were backing up and the patient wanted it removed. We know that it has been demonstrated by Dr. Brown that it can be done and the patient live. I have in a number of cases done a short-circuiting operation, and those patients have reported to me that they were apparently in good health. This question must be left for the future to determine whether or not we can promiscuously short-circuit and put out of business the large intestine, the ileocecal region, which nature has used as a method of really influencing, as far as anatomical studies are concerned, the diet of the animal. The question of the future must be decided by large statistics by those who are doing the short-circuiting operation, and we must have careful pathological reports and statistics from those who are doing the other operation, and only by such carefully prepared reports for years will we be able to determine which is the better procedure.

Dr. James E. Moore, of Minneapolis.—I have been greatly pleased at the conservative tone of Dr. Brown's paper, because this is certainly a subject in which we must be conservative. I question whether we can improve upon nature. I cannot help but feel every time we do a gastro-enterostomy, or any side-stepping of the intestine, we are violating nature's law, and the Almighty knows better about this than we do. I admire a man who has the courage of his convictions, whether he is right or wrong.

The point made by Dr. Bloodgood yesterday was a good one, namely, that when a man had arrived at the age of sixty he could give a lot of advice that would be of benefit to the younger men. By next spring I hope to be able to qualify in that regard. I tried yesterday morning to deliver a message to this Association. On the whole, it was kindly received, and Dr. Coffey and a few of my other friends who jumped on me did it honestly and conscientiously. They have accomplished a great deal of good. I want to say, I have done all of these operations repeatedly, and I do not do that now because the results do not warrant it. You must remember, in my paper, I stated there were exceptional cases all along the line. I quoted one case in which hepatopexy was done with splendid results. Dr. Ransohoff reported a case yesterday, and his

paper fitted in with mine very nicely. I called attention to the fact in the afternoon that less than six months ago I reported two cases in the *International Clinics*, in which I fastened up a floating cecum that was making a phantom tumor, with relief to the patient. Notwithstanding the splendid results that a number of the younger men are reporting at the present time, conservatism is the note I wish to sound here. I admire some of the results which Dr. Coffey reports. He is an honest, upright man, but we must bear in mind, gentlemen, that next to the wholesale removal of ovaries, of which I did my part, nothing has brought surgery into so much disrepute as this very class of surgery we are discussing now. Therefore, it behooves us to be sure of our ground, to select our cases carefully, and I am still doing some operations of this kind when nature has failed, when the scientific intelligent internists with whom I walk the hospital wards every day have said to me, "Here is a case that medicine and proper dieting have failed to relieve, can you do anything?" After such a statement, I, being a surgeon, try to do my best.

Dr. August Schachner, of Louisville.—I had the pleasure of seeing some of Mr. Lane's work this spring, and I was impressed with a number of things. In the first place, I could not help but believe that, like his views upon cleft palate and upon fractures, ultimately his views upon the colon will be accepted. I believe the reception of them at first will be a stormy one, and I believe the ground is a dangerous one. It will require a great deal of experience, a great deal of care in the selection of cases, in working out the class of cases that are really eligible for the procedure. But in the end I believe there will be a place for the excision of the colon. Like all new procedures, Mr. Lane's will, no doubt, be abused. The pendulum will swing to and fro, but in the end it will strike the centre of gravity, and as the gentleman has just said, we need a good deal of experience in this kind of work, especially in this class of cases, and we should be frank with one another in reporting the unfavorable results. Only when that is done can we find the exact place for Mr. Lane's operation. We have not only difficulty in selecting the cases that are eligible, but there are technical difficulties in its performance. The question of whether the colon should be short-circuited, or whether all of the colon should be removed, or whether most of the colon should be removed, is still to be settled. Although Mr. Lane

has been working at this for ten years, and we all know his ability as an operator, and the experience he has had, I feel sure from watching him that he is not quite certain of many features in connection with the subject, and if Mr. Lane is uncertain I think we ought to be doubly so.

One of the technical difficulties is the question as to whether it shall be a lateral anastomosis or an end-to-side anastomosis. I am quite aware that the lateral anastomosis is decidedly the popular operation, but as to whether it is really the best, I am not quite so sure. It involves the closure of two opened sections of the intestine besides the anastomosis itself. The lateral anastomosis, so far as the *immediate* results are concerned, is all right. But we must do more than merely cure the patient of the operation; we must cure the patient's condition for which he or she came. When we do a lateral anastomosis we know that all lateral anastomoses have a *tendency* to close, and we must make an effort to overcome this by a large lateral opening, as has been pointed out.

I am going to use the blackboard for a moment. Let this represent the sections (indicating). If that marks the anastomotic opening, we know that when we cut the circular fibres at this point, as has been shown by others, we have, opposite the opening due to the dimension of the circular fibres, a dead area. The contents are propelled from behind, directly forward and not around and through the opening. The result is, we frequently have an accumulation at the dead end. I saw one of Mr. Lane's cases in which there was quite a distention at the blind end. His tendency now is largely to place the end of the ileum into the side of the upper part of the rectum or the lower part of the sigmoid.

I would like to say in closing, that I quite agree with what Dr. Moore has said, that we ought to be extremely careful in moving along in this new field, because I think medicine right now is undergoing a transition. The field of internal medicine is being diminished through sanitation, through vaccination and sera, and the inroads that surgery has made until the public is now reconciled to surgery, but they expect results; they expect more than merely recoveries from operations. They want recoveries from the condition for which they seek relief, and we must remember that many of our patients are neurasthenics. It is a question in my mind as to whether their neurasthenia is, after all, due to their physical defects, which

we are able to discover, or whether it is not a fact that these individuals cannot cope with their environment. We should take a much broader view of it; that many of these patients through a strenuous existence become neurasthenic, and not so much through a prolapse of the large bowel that happens to be lower than we think it ought to be, or a kidney that happens to be looser than we think it ought to be.

Dr. Charles A. L. Reed, of Cincinnati.—I desire to express my appreciation of this paper, as I have expressed my appreciation of every paper I have heard from this author. I can echo the conservative note that has been sounded, but I see no reason why it should be sounded in criticism of Dr. Brown's paper. Dr. Moore has very properly said that these cases ought to be selected carefully, and that only the exceptional cases should be submitted to operation. It was cases of this particular type that made up the body of the author's paper. It seems to me, that if anything can be done in the line of conservatism, it is indicated in the cautious, judicious, courageous paper which has been read in our presence.

As Dr. Schachner has just said, it is well enough for us to pause to see whether or not the neurasthenic, the neurotic, the general and constitutional symptoms arising from these toxemias may not be controlled by environment. Evidence is being rapidly accumulated in the hands of such men as Dr. Brown, and it is being accumulated in my own hands and practice, to the effect that environment has been pretty generally exhausted before these cases come to the surgeon. When we find that the restoration of the colon to its approximately normal position relieves constipation and causes the headaches to disappear, and general nutrition to improve; when we find that these patients on returning to us three months later say that they have gained forty pounds in weight, with complete disappearance of all previous symptoms, then we know that the operation is not only reasonable and anatomically justified, but clinically confirmed. It has been along this line of conservatism that we have been working to better things than we have been doing in the past.

I had occasion to report to the Cincinnati Academy of Medicine not long since one of these cases, not a Lane operation, but a case in which the fecal current had been restored by the restoration of the normal position of the colon. The medical attendant, Dr. J. E. Greiwe, who had the case under

observation, informed the Academy that I was about to become the subject of some form of suit for damages because the patient had been compelled to get a new wardrobe, having gained nearly forty pounds in the short space of five months.

A patient from Indiana was in my office within the last three days upon whom I operated less than two months ago, who at that time had not had a normal evacuation of the bowels for two years, but who the day following the operation did not have a particle of trouble in that regard. She had gained enormously in weight since the operation, and was in Cincinnati to get a new wardrobe which would fit her.

When we find that the colon can be excluded without impairment of health, as in the cases reported today, and when we have carefully analyzed the reports of Lane and others; when we find that these results are not unique in his experience, but have occurred in the experience of myself and other operators; when we find that in cases that are judiciously selected, as were the cases of Dr. Brown, these results are always realized, then, I contend, the operation that has been reported here today is distinctly in the line of conservatism. I always notice one thing about a comparatively new method of practice, and it may be a wholesome thing, and that is, that every innovation is challenged at the threshold by the men who have not been doing it; they have not had satisfactory results because they have not done it; but when they do get satisfactory results following their adoption of the innovation, their academic objections speedily disappear, and things that they pronounced and denounced as unduly radical take their position in the category of conservatism.

Dr. George H. Noble, of Atlanta.—I regret very much that I did not hear this paper, but only the discussion of it. What I have to say may not bear directly upon it, but relates to a kindred subject.

The outline of the colon, sigmoid, and ileum on the blackboard will serve the purpose of illustration. In the place of resecting the ileum and anastomosing it with the rectum, I have been doing a latero-lateral anastomosis between the lower end of the ileum and sigmoid flexure for mucous colitis. Both sections of the intestinal canal are drawn through the abdominal wound far enough to make the work easy and prevent tension or gangling and partial obstruction of its lumen. This method does not divert the entire fecal current from the colon to the

rectum as other methods do, but turns a part of the fecal stream into the sigmoid flexure, while the remainder escapes into the colon by the natural route. The object is first to drain the most intensely infected section of the ileum into the sigmoid flexure. This decreases the amount of material entering the colon and coincidently lessens putrefactive decomposition, and at the same time a sufficient quantity of intestinal contents escape into the cecum to prevent atrophy of the intestine and to preserve its function without becoming a menace to health.

Of the first twenty-seven cases I did, I read a preliminary report before the American Gynecological Society three years ago, and by invitation read the final report before the Medical Association of Texas last May. Of this number 25 were mucous colitis, 1 ulcerative colitis, and the other megacolon. The intestine in the latter case was distended until its diameter averaged six inches. Of the 25 cases first reported, 75 per cent. were permanently relieved of constipation, headaches, tympany, and colicky pains. This percentage was slightly increased later on. One case had slight proctitis after the use of irritating purgatives. The patient with ulcerative colitis was cured of diarrhea in twelve months, but had blood-stained stools upon one or two occasions afterward from the use of castor oil. Those that were not relieved of constipation had hemorrhoids and digestive disturbances which were not treated.

The conclusions I drew from the study of these cases are as follows:

1. The operation will cure mucous colitis in properly selected cases. Patients with atonic dilatation of stomach, absence of free hydrochloric acid, etc., are not good subjects for the operation, and if it be done in this class of patients, persistent treatment subsequently for diseases of stomach should be enforced.

2. All contributing causes to constipation that can be relieved by surgical measure should have attention at the time the anastomosis is made.

3. A large percentage (75 per cent.) receive prompt relief from the operation, but others require from one to two years to effect a cure.

4. It is not to be depended upon as a cure to the exclusion of diet, exercise, and in some instances laxatives.

5. Partial diversion of the intestinal current into the rectum does not cause diarrhea, but that absorption of fluids by the

rectum causes "drying out" sufficient to cause more or less constipation in about 25 per cent.[1]

6. It does not interfere with nutrition.

7. The absorption of toxins is diminished but absorption of water is ample.

Dr. Brown (closing).—This subject has been so thoroughly thrashed out this afternoon in the discussion of the papers of Drs. Coffey, Bloodgood, and Ransohoff that there is very little left to say. I am convinced that in work of this type, we should be governed by a definite pathology, both palpable and perceptible unless there are pathological obstructions to the large bowel seriously interfering with its mechanics. I do not believe that we are justified in doing an operation which has for its purpose the switching of the fecal current. I think the Lane operation has a well-defined field of usefulness. Like all new procedures, however, it will be applied to cases in which the indications for its application are not present. To my mind, the most important fact resulting from the investigations of Lane and those of us who have been working along similar lines is the fact that it has been conclusively demonstrated that we can with perfect safety put the entire large bowel out of commission. The knowledge thus acquired will be of great benefit. I believe in many cases of amebic dysentery, cases of mucous colitis, and in many of the ulcerative conditions found in the large bowel with the making of a temporary anus on the right side, thereby putting physiologically at rest the large intestine, and when the purposes of this rest have been accomplished, the restoration and continuity of the bowel may be done quickly and with perfect safety. In many cases in which we used to do a left-side colostomy, we will now do the operation on the right side, simply opening the abdomen through a small incision, dividing the ileum above the ileocecal valve and purse-stringing a tube in both proximal and distal ends of the gut, then fixing the two ends of bowel in the wound. Such an anus can be closed without difficulty and possesses many advantages in selected cases over the left colostomy. While the left side operation can be made without difficulty, its closure, however, is a serious surgical undertaking. I listened with great pleasure and profit to the splendid paper of Dr. Coffey, and while I cannot

[1] Four of these cases were cured of mucous colitis, though not entirely relieved of constipation.

agree with his conclusions, nor have I done the operation in the type of cases he reports, I was glad to hear him accentuate the importance of carefully selecting cases for operation. In those cases where there exists no mechanical obstruction, I believe the method of treatment which I have outlined, namely, putting these patients to bed, making a right-side anus, and then putting the large bowel completely at rest, and later on following this either with the restoration of bowel continuity or the Lane operation, the results will be better than the fixation procedure so splendidly illustrated by Dr. Coffey.

PARATHYROIDS AND THEIR SURGICAL RELATION TO GOITRE

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and
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During the last several years the parathyroids have been studied by various methods, and although our definite knowledge of their physiological function and pathological importance is limited, to-day we are justified in saying that these little glands are concerned in the metabolism of the body, and, consequently, that disturbances of them are of serious interest to both the internist and the surgeon. But what seems to be the natural course in matters medical, the parathyroids, once recognized, became the object of numerous hypotheses. Theories have been advanced and diseases attributed to these structures without having the support of scientific investigation. Erroneous deductions have been made from defective experimentation, histological conditions overlooked, and the findings misinterpreted. Illogical conclusions have been based on the administration of therapeutic agents, as, for example, the failure of parathyroid extract to control the attacks of tetany. However, recent and more exact methods of examination have dissipated many of those erroneous views and caused our minds to be focussed upon something definite.

There no longer seems to be substantial grounds for doubting the etiological relationship between the parathyroids and one disease, namely, tetany.

Experimental tetany has been produced in animals by the removal of parathyroidal tissue, and to experimental tetany may be reckoned, in a certain sense, tetany following operation upon the human thyroid gland.

Histological investigations of recent times have not only confirmed the results of experimental work, but also demonstrated that *spontaneous tetany* is caused by an *hypoplasia* with resultant *insufficiency* of the parathyroids. Therefore, in this paper we shall discuss these glands in their relation to the disease of tetany, but before considering the *surgical* aspect of the subject we shall briefly review some of the later works on the *spontaneous* form of this disease.

Tetany manifests itself by spasmodic attacks, which usually occur bilaterally, are often associated with intense pain, sometimes with slight edema of the face, hands, and feet, and the latter have a tendency to assume a partial equinovarus position. In the *interval* between the attacks, the principal diagnostic points are *Trousseau's sign,* a peculiar tonic spasm of the fingers and thumb, the so-called *obstetric hand,* produced by prolonged, severe pressure upon the nerve trunks, particularly the median nerve; *Chvostek's sign,* twitching of the facial muscles, elicited by tapping upon the trunk of the facial nerve, upon the malar bone, or over the infra-orbital foramen; *Erb's sign,* galvanic hyperirritability of the muscles, which contract to very weak currents; *Hoffman's sign,* extreme sensitiveness to the induced current.

Whereas *spontaneous* tetany is mostly observed in the child, yet attacks occur in adult life, and among these are cases of *tetania gravidarum.* Pathological examinations seem to have proved that hemorrhages in the parathyroids have a positive significance in the causation of tetany, especially the tetany of childhood, and that these hemorrhages produce their effect by injuring the parathyroidal tissue, inhibiting its development, and, consequently, decreasing its functional power. Haberfeld has recently reported six cases of

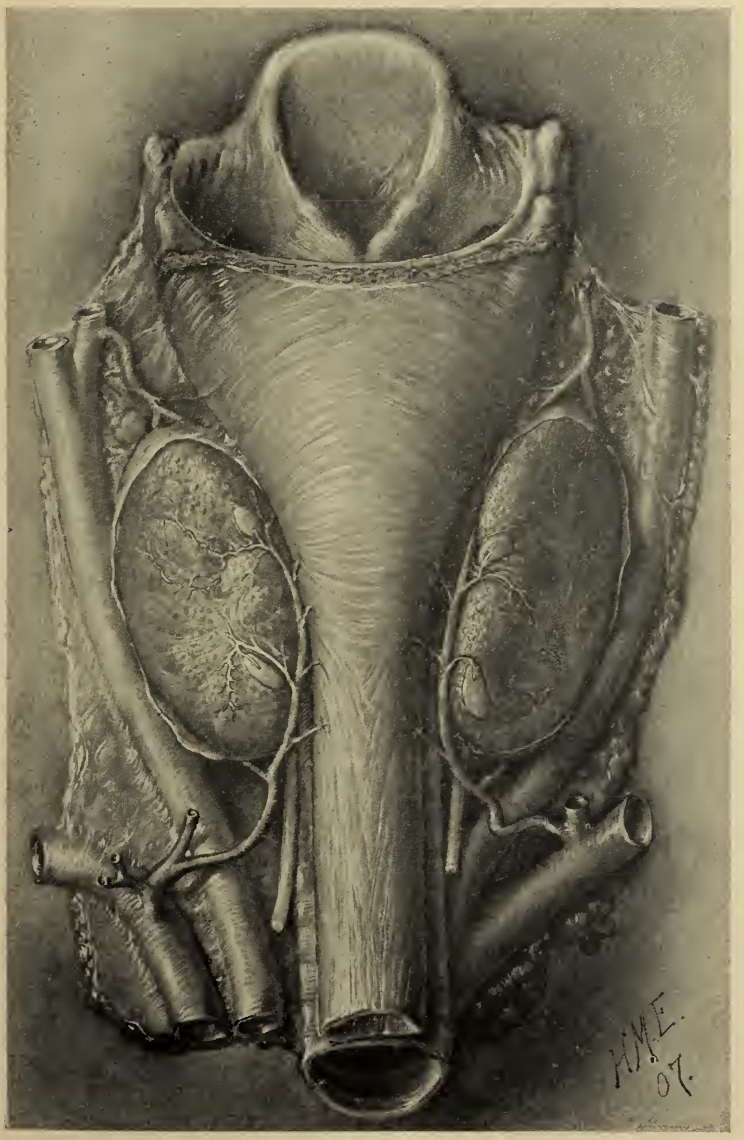

Fig. 1.—Parathyroid glandu'es. (Halsted and Evans.)

Fig. 2.—Cross-section through right superior parathyroid. Tetany, patient aged five months. Almost entire parathyroidal tissue destroyed by enormous hemorrhages. *H*, remains of parenchyma in the centre and as septa between the blood cysts, *P. R.* Many phagocytes (*P*) with pigment in the blood cysts, consequently signs of old hemorrhages. The zone of development completely absent. (After Haberfeld.)

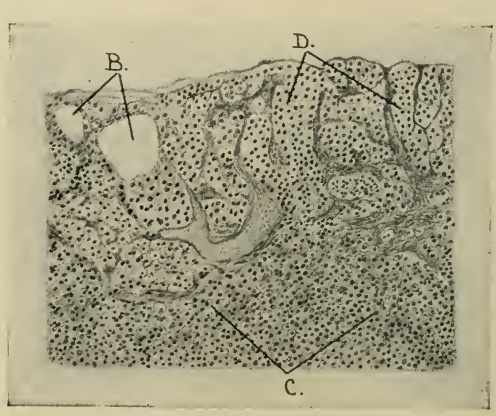

Fig. 3.—Small area of a parathyroid. Tetany, patient aged five months. *C*, small dark cells of the centre; *D*, zone of development showing large light cells which are absent at *B*, replaced by blood cysts (old hemorrhages). (After Haberfeld.)

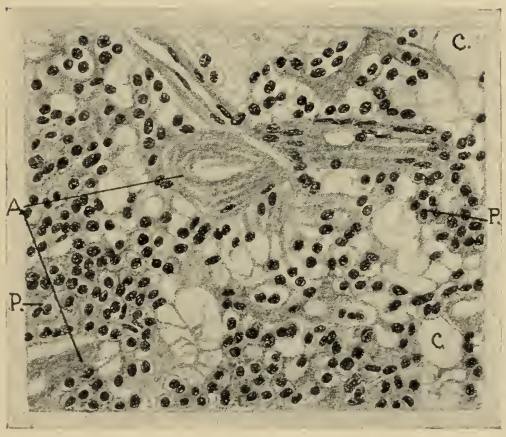

Fig. 4.—Tetany, patient aged twenty-four years. Amyloid degeneration of small vessels. *A*, cells near vessels show hydropsical degeneration, absence of nuclei, and swelling of protoplasm; *C*, loss of cell membrane with cavity formation; *P*, normal appearing parathyroidal cells. (After Haberfeld.)

Fig. 5.—Tetania gravidarum. Patient aged thirty-one years. × 50. Area of a parathyroid showing moderately large, radiating cicatrix (*C*); vessels (*V*). (After Haberfeld.)

Fig. 6.—Same case as Fig. 5. × 125. Part of the cicatrix (*C*) is seen. Individual epithelial cells in this region swollen in places uniting and forming small cavities (*D.E.*). Vessels (*V*). (After Haberfeld.)

Fig. 7.—Same case as Figs. 5 and 6. × 160. Small area of a parathyroid which is almost completely atrophied. The section shows for the most part connective-tissue bands bearing many small vessels. Remains of original parenchyma (*P*); vessels (*V*). (After Haberfeld.)

undoubted *tetania infantum,* whose parathyroids showed hemorrhages, which manifested themselves partly as blood cysts and partly as old hemorrhages with hematogenous pigment. It has not been possible to positively fix the exact time of the bleeding, but many points favor Erdheim's view, namely, that it takes place during labor. In support of this opinion are very young cases (four weeks, four months old), presenting *old* hemorrhages, and the fact that the parathyroids are not disposed to bleeding, so that the mechanism of labor with its associated trauma can very likely play an important part. The explanation has been advanced that in extreme flexion of the child's head the chin presses upon the region of the parathyroids, and thereby injury is produced.

In this connection another point of interest has been revealed. Several of Haberfeld's cases showed absence of valves in the veins of the affected parathyroids, while the valves were present in the glands which were intact. Therefore, deficiency of venous valves has also been considered by recent investigators as contributing to the occurrence of these hemorrhages, since it is maintained that in the presence of increased blood pressure these valves are a safeguard against bleeding. It has been suggested that these hemorrhages in the parathyroids are the *effects* of the convulsive attacks and *not* the *cause* of the tetany. Cases have been reported in which autopsy revealed not only hemorrhages in these glands but also areas of recent bleeding in the pericardium and the pleuræ. However, special methods of examination positively proved that the hemorrhages in the parathyroids antedated the beginning of the convulsive seizures, consequently could not have been caused by them.

An objection that has been advanced against the hemorrhagic theory, and one that deserves discussion, is the fact that the attack of tetany does not occur at the time of bleeding, but instead manifests itself very often only after the hemorrhages have been completely healed. That injury

of the parathyroids takes place when the bleeding occurs is to be admitted, and that tetany does not appear simultaneously with the injury are facts which seem to be grounds for rejecting this theory. Escherich explains this apparent contradiction as follows: The central nervous system of the newborn is so insensitive that the clinical picture of tetany cannot manifest itself, and that such manifestation is only possible beginning with the third month. Escherich's view seems to be supported by the facts that the brain of the fetus contains the highest amount of calcium (Quest), and that here calcium decreases with advancing age. Sabbatini has demonstrated that cerebral irritability is lowered by an increase of calcium and raised by withdrawal of the same. Therefore, it is concluded, tetany does not occur at the time of bleeding, because at this period the brain's irritability is very slight, which is due to the presence of a larger amount of calcium.

With regard to the importance of calcium in the condition of tetany, the writers refer to the observations of MacCallum and Voegtlin. These investigators have undertaken a study of the calcium metabolism of animals, in which this disease is produced by parathyroidectomy, and are endeavoring to demonstrate the relation of various salts, especially those of calcium, to experimental tetany. They state that all violent symptoms produced by parathyroidectomy—muscular twitching and rigidity, tachypnea, fibrillary tremors, increased rapidity of the heart beat, etc.—may be almost instantly cured by the intravenous injection of a solution of a calcium salt. The acetate or lactate in 5 per cent. solution is usually employed. Subcutaneous injection or the introduction of the solution into the stomach is quite as effective, but acts more slowly. The results from the use of magnesium are similar, but its otherwise bad effects contraindicate its employment.

The condition of relief following the administration of these various salts lasts for perhaps twenty-four hours, when tetany

may reappear. Analysis of the blood taken from a dog during tetany shows a calcium content which is only about half that of the normal dog on the same diet. These writers state that from their observations up to the present it is possible to construct at least a plausible, working hypothesis by which to explain their results. Apparently the parathyroids control in some way the calcium metabolism, so that upon their removal a rapid excretion, possibly associated with inadequate absorption and assimilation, deprives the tissues of calcium salts. In the case of tetany the central nervous system seems to be especially affected, as has been demonstrated by experiments in which muscles isolated from the central nervous system presented no twitching during the attacks.

However the salts of calcium and other salts may be concerned in maintaining a state of equilibrium in the function of the nervous system, and whatever may be the relation of the parathyroids to calcium and other metabolism, recent investigators state that all their experiences with tetany have shown that *insufficiency of these glands* is necessary for the production of tetany. This insufficiency occurs in experiments through removal of parathyroidal tissue; and in the *idiopathic tetany* of man it is caused by an hyperplasia of the parathyroids in consequence of pathological processes.

In children there have been found hemorrhages which, when they were relatively fresh and large (blood cysts), presented evident severe injury of the parathyroids. But how is the insufficiency and therewith the tetany to be explained when even before the outbreak of the disease these blood cysts have been gradually absorbed and only more or less blood pigment is to be found? As Erdheim has stated, by itself this pigment can scarcely produce injury of the parenchyma, but in spite of that fact it must be looked upon as the expression of a tissue injury which causes insufficiency of the parathyroids. Whereas it is not to be supposed that

every hemorrhage in these glands produces hypoplasia, yet Yanase had never been able to demonstrate clinically normal galvanic irritability in any child whose parathyroids showed anatomically hemorrhages, even in slight amount.

Tetany is not to be explained alone by injury of parathyroidal tissue. There have been cases in which the glands were undoubtedly injured, that is, parathyroids disposed to tetany, but the attacks did not occur until another factor entered, for example, gastro-intestinal disease. Therefore, these patients lived for many years with defective parathyroidal tissue and were not seized with tetany until a contributing factor, whereby an excess of the toxic material was produced, caused hypofunction of the glands to be manifested. Beside the hypoplasia resulting from hemorrhages, other conditions have been noted in association with deficient development and insufficiency of the parathyroids. Haberfeld cites two cases of congenital syphilis, in which tetany developed and the parathyroids were shown histologically to be hypoplastic.

The same investigator was the first to examine the parathyroids in a case of tetany occurring in pregnancy. All four of the parathyroids showed pathological changes, which included large scars, parenchymatous atrophy, and cysts. Therefore, basing their conclusions on experimental, clinical, and pathologico-anatomical investigations, recent writers state that the principal factor in the production of tetany is *insufficiency of the parathyroids.* This insufficiency may be either *absolute,* that is, referred alone to the glands, as by their absence (operative tetany), or relative, in which case the parathyroids are hypoplastic, consequently disposed to tetany, and hypofunction is precipitated by a contributing factor, as, for example, gastro-intestinal disease. The latter form seems from investigations to be the more frequent, and, for the tetany of children, is almost a law. Accordingly, injury of the parathyroids is to be regarded as disposing to tetany, while the releasing factor, whose nature still remains obscure, is undoubtedly of a very varying kind

(infection, pregnancy, etc.). It is probable that the parathyroids, like other glands of the body, have factors of safety, which is somewhere between two and four times.

Surgical Importance of the Parathyroids. Viewed in the light of all the experimental, clinical, and histological works which have been done, these glands are to be regarded as structures possessing a function that is essential at least for the normal metabolism of the body. Although the results of animal experimentation are not uniform with regard to some points, yet they have proved that removal of parathyroidal tissue is usually followed by a symptom complex which is termed *experimental tetany.*

Histological examinations have shown pathological changes in the parathyroids of typical cases of spontaneous tetany, and that these changes represent a *hyperplasia,* deficient development of the glands, which disposes to insufficiency of function, and also that these structural defects seem at times to be the result of trauma. Consequently, guided by these scientifically supported facts, the surgeon should scrupulously guard against removal or injury of the parathyroids. Remembering their variable size, location, and appearance, the operator should preserve all small, especially gland-like, masses about the capsule in case of operation on the thyroid gland. If such a mass be accidentally removed in the course of operation it should at once be implanted beneath some part of the remaining capsule. Probably the greatest danger is in operating upon both lobes at the same time or the second lobe at a later period. Furthermore, it should be borne in mind that parathyroidal tissue is sometimes present within the thyroid gland. Although rare in the human, this important observation has been made by Müller, Getzowa, Michard, Kloeppel, and others, and is to be considered in the presence of tetany following removal of thyroidal tissue, where the normal location of the parathyroids had been easily avoided. Besides the variability of the parathyroids in size, appearance, and location, another point of interest is to be kept in mind,

namely, the observations of Vincent and Jolly on the relationship between parathyroidal and thyroidal tissue. These investigators state that the thyroid and parathyroids are morphologically and functionately related; that the parathyroids left behind after thyroidectomy can, under conditions, develop in the direction of thyroidal tissue, and that a functional replacement also takes place.

Assuming that relationship to exist, it is conceivable that in some cases manifestations, which are the sequelæ of parathyroidal disturbance, may follow operations upon the thyroid gland. On the other hand, considering the generally unstable metabolic equilibrium and the associated psychic disturbances of many patients suffering with hyperthyroidism, we should not be at first too greatly concerned over a postoperative tetanoid attack, since it is intelligible that such manifestations might be precipitated by operative procedure. A few such cases have been observed and considered probably hysteroidal in nature.

Treatment. No reliable treatment for tetany is at present known, but the experimental works of MacCallum and Voegtlin, together with the clinical and histological observations of Erdheim, Strada, Yanase, Haberfeld, and others, suggest certain principles to be followed. According to these investigations deficient parathyroidal tissue is the principal causal factor in the condition, and there seems to be a disturbance at least of the calcium metabolism. Consequently, the ideal treatment would be to compensate for this glandular deficiency by transplanting parathyroids from other individuals, feeding with animal glands, the use of serum or the extract of parathyroidal tissue. Unfortunately none of these procedures has given dependable results. In order to restore the balance in calcium metabolism, calcium salts, acetate or lactate, should be administered either intravenously, subcutaneously, by stomach, or by rectal enemata, the strength of dose varying with the mode of administration.

In order to avoid those factors which contribute to the

attacks of increasing the toxic metabolic product, the patient's general condition, especially the gastro-intestinal tract, should be given most careful attention.

In 3203 operations on the thyroid gland in St. Mary's Hospital, the total number up to December 1, 1911, but one patient is known by us to have manifested signs suggestive of tetany, yet when such signs do appear we cannot but feel that the condition is due to some error in operative technique.

Case I.—G. H. S., female, aged forty-five years. Consultation August 2, 1911. Clinical diagnosis, simple goitre. Family history, one sister had goitre. Personal history, two operations for lacerated perineum, last one eleven years ago. Sciatica, right leg, five years ago. Right lobe of thyroid gland enlarged for twenty-five years, left lobe for twelve years. Growing more rapidly the past three months, during which time the patient became nervous and suffered from dyspnea. Rather despondent for last six months. No edema. Able to do regular work up to present time. Operation, August 11, 1911 (St. Mary's Hospital), partial thyroidectomy, enucleation of cysts. Pathological diagnosis, adenomata; cystic degeneration. Post-operative course: August 12, 1911, patient complained of stiffness in fingers and face, and tingling in legs. Fingers rigid and partially flexed at metacarpophalangeal joints, thumbs in palms; toes also flexed. August 13, 1911, patient complained of decided increase of symptoms. Treatment: 2 gm. calcium lactate subcutaneously; thyroid extract, 0.3 gm. every four hours for three doses; calcium lactate, 0.6 gm. by mouth t. i. d. during the remaining time in hospital; trional, 0.6 gm. at night. August 14, 1911, rigidity less and gradually diminished until the sixth day after the operation, when it disappeared entirely. August 19, 1911, patient discharged from hospital.

It is questionable whether in this case genuine tetany was present, since some of the diagnostic points were wanting. The fact that symptoms subsided so soon after treatment might be suggestive, but a deduction from such unreliable

premises would lead to error, especially since the signs did not reappear, and thyroid instead of parathyroid extract was used. Experimental evidence shows that whereas tetany is relieved by the administration of calcium salts, yet the attacks tend to recur after twenty-four hours. Extract of thyroid gland was administered, but the indication for its employment is not supported by scientific investigation other than that the functions of the parathyroid and the thyroid seem to be interrelated. Even parathyroid extract has failed to produce effects in some cases of undoubted tetany (parathyroids removed at operation), although the treatment was continued for months.

Adhering closely to the view of parathyroidal causality in tetany, if the above was a genuine attack, either the parathyroids were already hypoplastic and rendered temporarily insufficient by the operative procedure and postoperative disturbances, or they were injured during operation, in which case an unusual location must be assumed, since only partial thyroidectomy and enucleation were performed on the thyroid gland of this patient. Finally, when the increasing nervous condition of the patient during the last several months is considered, the possibility of the manifestations having been hysteroidal in nature should be kept in mind.

References

Erdheim. Beit. zur path. Anat., 1904, xxxv, 366.

Escherich. Wiener klin. Woch., 1907, p. 969.

Getzowa. Virchow's Arch., 1907, cxxxviii, p. 181.

Haberfeld. Separatabdruck aus Virchow's Archiv for pathologische Anat. und Phys. und für klin. Med., 1911, Bd., cciii.

Kioeppel. Beitrage zur path. Anat. und zur allg. Path., 1910, Bd. xlix, Heft 3.

MacCallum. Johns Hopkins Hosp. Bull., 1908, xix, pp. 91 and 92.

Michand. Virchow's Arch., 1908, Bd. xci, p. 63.

Müller. Beit. zur path. Anat., 1896, xix, p. 127.

Strada. Path. riv. quindicin.: Geneva, 1908-9, i. pp. 423 to 437.

Yanase. Wiener klin. Woch., 1907, p. 1157.

Voegtlin. Johns Hopkins Hosp. Bull, 1908, xix, pp. 91 and 92.

Vincent and Jolly. Science Progress, 1908-9, iii, pp. 410 to 424.

THE END RESULT OF OPERATIONS IN GRAVES' DISEASE

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I have recently investigated the results of operations on cases of Graves' disease.

This subject at once divides itself into two classes, viz., the immediate effect and the remote. A study of the immediate effect is of special interest when considered with reference to five points. The first is the condition of the patient at the time of operation; the second the type of operation performed; the third, the method of operation; the fourth, the pathology of the gland; the fifth, is the relation between the evidences on the clinical charts, and the evidence of the bedside phenomena.

When, a number of years ago, I resolved to make an extended study of Graves' disease, I began the study on the theory of Kocher that the value of surgical operations in Graves' disease depended upon the theory that in Graves' disease there was a harmful hypersecretion of the thyroid. On that basis one argued that any case of Graves' disease would be benefited if the gland secretion could be diminished, hence the more severe the disease the stronger the indication for operation. Indeed, there was at first but little opportunity to observe any but those cases already in their last stages. Cases with widespread degenerations of most of the body, especially of the heart, brain, and liver. They included those emaciated to a skin

and bone outline of their former selves; those whose hearts spread out flabbily occupying much of the thorax; those with widespread edema; those with high fevers; those delirious and who had to be restrained in bed; those with partial dementia. Certainly desperate risks; but I argued that if hypersecretion is the primary and essential cause of the disease there was a sound reason for thyroidectomy as for other urgent means. It is scarcely necessary to relate the actual experiences that followed operations in these serious cases by the older methods. The mortality was, of course, high as shown in Marine's report in the *Archives of Medicine*. This brings us to the second point, viz., the type of operation performed, the furious symptoms and the too frequent fatalities made Kocher's suggestion to ligate a single vessel, then another, then perhaps excise a lobe, an aid. But the operation by progression, though an improvement on the more radical lobeotomy, still had its toll in the severest cases. This lead me to the next step, viz., a study of the factors of danger in the operation. This could be done only by clinical experience. At first I thought that ether anesthesia was an unfavorable factor, and I tried local anesthesia, but again I found that in the severe cases the same furious reactions followed operation. Noting two deaths from fear of the operation alone, and the many examples of the havoc of fear in outside cases, the psychic factor was next studied. This factor proved to be important. Again experience taught me that although the exclusion of the psychic factor markedly diminished the risk, some cases still ran a stormy postoperative course and the occasional case succumbed. About this time the new hypothesis first stated in the Ether Day Address apparently cleared up the mystery of the postoperative explosion and led to the operation by anoci-association. Even after this principle was established I was confronted by a rather puzzling fact, viz., that although a lobe might be excised without changing the pulse, even in severe

cases, and although the furious postoperative phenomena could be almost wholly avoided I was disappointed to find that a patient could not withstand the metabolic strain of a sudden diminution of the thyroid secretion beyond a certain point, that is to say, if one could wash out a lobe his patient might die a metabolic death, a death unlike that of the explosive postoperative course following the usual technique. This led to the last and present status, viz., that if the principles of anoci-association are perfectly carried out, there will be no deaths from so-called hyperthyroidism; but there will still be metabolic death if too much thyroid is thrown suddenly out of activity or excised. From the first up to the present time I operated on every patient that presented itself on the ground that medical treatment being futile there was left no hope but surgery, and there being little or nothing to lose and much to gain, I tested to the fullest extent the surgical possibilities.

The next point of interest is that of the relation of the pathological findings and the clinical symptoms. During this period of development of the surgical problem, the clinical records of the cases in the Lakeside Hospital, and the pathological specimen were placed at the disposal of Dr. Marine for his personal investigation.

On the thyroid excised Dr. Marine made iodine determinations, and histological studies. From these studies several interesting deductions can now be made, viz., that the morphological findings and the iodine content are but relative indices as to the severity of the clinical symptoms and are of less value in making a prognosis or a classification than are the clinical signs. Another point of interest is this—the iodine content being diminished in the glands in Graves' disease, Marine drew the deduction that in Graves' disease there is a hypothyroidism, not a hyperthyroidism. Then, too, Marine concluded on the study of my material that the operative risk as well as the clinical end result could be predicted with confidence from the laboratory findings,

but actual experience has shown that the clinical picture is a far more reliable index.

As to the relation of the laboratory findings and the surgical risk, our actual results show that serious cases that succumbed to surgical operation in the early series are now saved. A laboratory prognosis of several years ago is obsolete today. Hence, any prognosis as to immediate result is based on the shifting sands of surgical progress. Marine draws opposite inferences from our own from the diminished iodine content. Marine holding that this indicates a hypothyroidism, hence a surgical operation could not be a benefit. Granted that the iodothyrine is the principal active substance of the thyroid, the gland is enormously vascularized, hence I infer its activity is greatly increased. A further significance of this increased vascularity is seen when coupled with the probability as shown by Beebe that the iodine circulates between the rest body and the thyroid in a manner analogous to the circulation of the bile salts between the intestines and the liver. The iodine probably forms a compound in the thyroid, is carried in combination to some other part of the body, is broken down in the course of its function and then is returned again to the thyroid. A given amount of iodine under these conditions might perform many times the function of iodine held in the quiescent colloid gland. It is probable that in the colloid gland much of the iodine is merely stored presumably until required. This inactive stored iodine is, by the laboratory methods, compared in work value to the active iodine in Graves' disease. Beebe tells me that he has never found the gland of any case of Graves' disease without some iodine. Lastly, it is probable that there are other active substances in the thyroid gland besides the iodine compound.

Then, again, it is well known that in Graves' disease the body reacts abnormally to thyroid extract and to iodine.

Even small doses of iodine or thyroid extract may cause death in precisely the type of advanced case of which we

were speaking. It is, of course, an axiom that when laboratory findings run counter to clinical phenomena the laboratory must readjust itself. Comparing the observations made by ourselves and those of Marine with the clinical phenomena presented by our cases, I conclude that the laboratory findings are at best but a poor index of the patient's condition, or of his future prospects. The last point of interest relating to the phenomena observed in the hospital is the inadequate index the clinical charts are to the actual condition of the patient. In some cases a study of the clinical chart is as far removed from indicating the patient's condition as the temperature and pulse indicate the state of the patient in cirrhosis of the liver. The immediate risk depends on the technique employed and the amount of thyroid tissue thrown out of function. If the thyroid was in a state of hypothyroidism then removal of the gland could cause neither benefit nor injury, and the administration of thyroid extract or iodine should prove an advantage. From an abundance of clinical experiences we now know that these propositions do not hold.

In comparing the laboratory findings of Marine and ourselves without clinical findings we find that as compared with the clinical picture the laboratory findings are of relatively little value in making an immediate or a remote prognosis.

In the early cases of my series, composed almost wholly of desperate risks operated by methods then in vogue, the immediate mortality was high. The surgical situation was similar to that of the earlier stage of surgical treatment of appendicitis. It was not appendicitis that the surgeon was confronted with, it was general peritonitis bacteriemia, the late stage of sepsis. Unless an appendicitis had reached an apparently hopeless stage it was not considered to be ready for the surgeon. But the hard lessons in these desperate cases of acute appendicitis taught us the art and gave us the principles by which appendicitis has been mastered.

So, too, in Graves' disease we have been and still are asked not to treat the primary state but the stage of degeneration of the liver disease of the bloodvessels, myocarditis, pancreatic deficiency, degeneration of the central nervous system, and a general metabolic destruction. It is too frequently the wreckage we were asked to deal with. But the hard experiences here has given us methods and principles by which we will as surely solve this problem as the problem of appendicitis was solved.

Since conducting operation on the new principle of anociassociation, and recognizing the importance of Kocher's progressive elimination of glandular activity, the mortality has all but disappeared excepting in those that are potentially dead at the time of operation.

Then why operate on these desperate risks? Because I have seen the delirious, the edematous, even the demented recover.

But we must pass on to the end results. What may a patient reasonably expect from an operation? It depends upon whether the fire is extinguished when it began or when the roofs and the walls had crumbled. It depends on whether or no the torch is to be reapplied to the part remaining. When the disease is of long standing in patients of poor physical structure, and whose financial and social circumstances permits of no mitigation of the strain of life during the time of convalescence, the results are correspondingly impaired.

I know of no way of stating the precise result of operations in this disease, this protean disease of body wide changes. If one were to state the effect of our physical training, of a mental breakdown of the overambitious student, of nervous prostration, of the overworked and worried business man, or if asked to state scientifically the end result of an overwhelming grief how could it be done. Studying the end results of my patients I may make several generalizations. No patient died of the disease after leaving

the hospital; no patient was made worse by the operation; every patient was either benefited or cured.

Among the factors that influenced the end results were the environment of the patient, the freedom from nervous shocks, the means at hand for diversion as well as the avoidance of strain. The elimination of all nervous shock at the time of operation has proved a good clinical asset.

The improvement began usually the next day after the operation and continued for from six months to two years.

I regard patients as cured when they are able to withstand nervous shocks such as fright, disappointment, worry, etc., in a normal manner. I have found that the time required for a complete cure is dependent upon the environment of the patients, automobiling, travel, yachting, nature-study, happier turn in the tide of life are the ideals that facilitate the cures. I know of no class of patients who are so intensely grateful, who become such militant partisan advocates of the operative treatment of this disease as the cured cases. There may be hesitation on the part of practitioners to recommend surgical treatment for Graves' disease, the cured patients share no such doubt. They are stronger advocates of operation than the most surgical surgeon. I may say in conclusion that the immediate operative risk is approaching that of operations for acute appendicitis, that all operative recoveries are either improved or cured, that the extent of the cure depends largely on the environment and medical direction during the year following the operation. I know of no class of patients whose relief is so deeply fundamental, than these patients tortured by an ever-present pathological emotional state.

DISCUSSION ON THE PAPERS OF DRS. MAYO AND CRILE

Dr. J. Garland Sherrill, of Louisville.—This paper of Dr. Crile leaves very little to be said on this subject. The

paper is very comprehensive. Dr. Crile has presented the results of his experience in a very clear way which will be of interest to every practitioner who may wish to read his paper when it is published. We are all to be congratulated on having heard this splendid contribution.

Dr. Miles F. Porter, of Fort Wayne, Indiana.—I have enjoyed both of these papers immensely. Some of you may know that I have been more than usually interested in the study of the thyroid and its function, together with the function of the parathyroids for some time. I do not care to go into the subject of the iodine content and its value as a laboratory finding in arriving at a conclusion as to the actual physical status of the patient, nor do I care to go into the possible association of hypo- and hyperthyroidism in these cases, but wish merely to say a few words on the only practical theory up to date we have to work on, namely, that these cases of so-called Graves' disease come to us because they are suffering from a hyperactivity of the thyroid gland, and that so far as our knowledge goes today, the best thing we can do for them is to put a certain portion of this thyroid gland out of commission.

Early in my work I was confronted, as every man was, with two particularly interesting types of cases. First, we saw the individual who was but little sick, perhaps was able to attend to his or her duties, and he or she was put into the hands of the practitioner of medicine, the internist, and in the course of six months or a year or two, or three years, the patient turned up in the surgeon's office a substandard surgical risk. It occurred to me that inasmuch as it had been demonstrated by Wyeth and others that we could cure an angioma by the injection of boiling water, we could likewise cure hyperthyroidism by the injection of boiling water. I first had the injection of boiling water tried on the thyroid glands of dogs, and to make a long story short, it was demonstrated that we could cause a large thyroid in the dog to disappear by injecting hot water. You could make the normal thyroid disappear; and further, it seemed to me that there was no reaction or anything to be feared in the way of danger. I next commenced trying it on the human being, and I want to say that up to date I have had absolutely no untoward symptoms, nor have I seen a case that has not been benefited or cured by the injections, and I am inclined now to think that we have in

the hot water injections a valuable aid in the surgical treatment of this disease. I want to say parenthetically that I have not stopped doing thyroidectomies. If a case of Graves' disease presents itself to me with symptoms that indicate that it is a perfectly safe surgical risk, I am still inclined to believe that the best, quickest, and safest way to cure that patient is by removing the thyroid. But those cases which come to me who are still able to work are not very sick, with a pulse of 110 or 120, who after they have worked half a day, take a recess of an hour or two, or lay off for a week or two, I treat with hot water injections, and up to date I have had no failures. I have some cases under treatment, but not cured. I recall one case in particular. A female patient, who had been a semi-invalid for years, and who went three months without a menstrual period, who had a single enlargement of the right lobe, was able to go to work and to continue at her work after forty minims of boiling water had been injected into the gland. The other class of cases, particularly those that come into the hands of the surgeon, with a pulse that can scarcely be counted, with an irregular heart that runs wild and crazy at the slightest provocation, who have lost weight, whose menses have stopped for some time, can be treated with injections of boiling water; and, it seems to me, these cases can be cured or at least brought to be safe surgical risks. One such case as this was reported in the *Journal of the American Association* a few weeks ago. When this patient came to me she weighed 87 pounds. After injections of boiling water, she soon gained materially in weight, and lost most of her symptoms. The goitre was enormous. And while the injections materially reduced the size of it, it still remained large enough to produce considerable deformity; accordingly, the patient being now a good risk, thyroidectomy was done.

I wish to say that the hot water injection treatment is now put on a basis that warrants its further use in the hands of good men.

Dr. R. S. Hill, of Montgomery, Alabama.—I would like to ask Dr. Porter, as a rule, how many injections are given, and does the gland shrink after the injection?

Dr. Porter.—That depends. Another advantage of this injection is that it can be more absolutely controlled than can be done in a thyroidectomy, particularly as to the amount of gland you put out of commission. If you are afraid of

putting too much of the gland out of commission, you give one injection of forty, twenty, or thirty minims of boiling water, wait a week, and then give another injection, and so on. I do not think I have ever injected less than thirty minims at one time, and never more than one hundred minims at one time, and never more than one hundred minims at one time, at one point. I have injected one thyroid at three different points as high as three hundred and eighty minims of boiling water at one seance.

A Member.—Is the patient under an anesthetic?

Dr. Porter.—No, sir. These patients do not need an anesthetic. They complain of nothing except the hot needle and a fulness in the neck, which is very much of the same nature as when the Schleich solution is injected into the skin. Schleich solution into the skin at the points where the needle is to be inserted is all the anesthetic needed.

Dr. Albert Vander Veer, of Albany.—When any progress is made in our profession, there is nothing that impresses me more than this subject of the thyroid gland, the enlargement of it, the pathological conditions met with there, and the two papers we have just listened to are most interesting.

Let us go back to the early study of these cases. In 1866 I operated for the removal of a good-sized thyroid without any artery clamps, without any of the modern instruments, and when I speak of that it seems like a fairy tale. I have followed along from that time down to the present, not only in regard to operative procedures, but with reference to the pathological study that has been made in the laboratory, and the course of the clinical classification of the symptoms presented, so that I have been very thoroughly impressed this morning with these two admirable papers.

I cannot go into a detailed or minute discussion of these papers because they have covered the ground so thoroughly, and I do not feel equal to it. But I want to say this in reference to one remark that was made by Dr. Crile in his paper, namely, that the laboratory side must bend to the clinical side of the case that presents. I am satisfied of that from clinical experience.

With reference to the excellent paper of Dr. Mayo on the parathyroids, I have been very much interested in this subject, and his second paper on the subject has been interesting to me in every particular.

In 1866 I operated upon a fine, splendid looking young lady, removing both lobes. She improved for a time, and presented one of the first cases of myxedema that was reported in this country. This case made a great impression upon me. I studied the case with care and read as much of the literature on the subject as possible, and found there were criticisms as to such complete removal. I have varied the operation since that time, as I found it was wise to leave some portion of the gland behind, and when we got these papers on the parathyroids from Dr. Mayo, the great lesson was brought to me of the preservation of these little bodies that we have overlooked, and about which we knew nothing in our early operations. When I consider that, I, for one, at the extreme age of threescore years and ten, can say there is nothing in the profession, at the close of my professional career, that makes me so thankful, that causes me to rejoice so much as the progress that has been made in this one particular subject by these younger and middle-aged men.

Dr. William D. Haggard, of Nashville.—In estimating the end results of any one condition, it seems to me you rarely find any man tabulating such results from the medical side of the disease. I do not feel that we should look alone to the surgeons to make good the delays in diagnosis, and then, after all, forms of fanciful treatment that are absolutely unavailing have been tried, call in the surgeon to take charge of these desperate cases. There are cases in which he feels like he is walking on a basket of eggs, in that anything he may do is extremely hazardous. Dr. Crile is to be commended at this time, because while the surgeons were going along in a quiet way doing this evolutional work, there comes criticism from the medical side of the profession, which is not unknown to some of you, and from the laboratory side, ostensibly disproving and discrediting much of the work done by the pioneers like Mayo and Crile. I, therefore, feel that this paper is extremely opportune and interesting. In the past we have been called upon to operate on these cases *in extremis*, and they are the ones that have given the mortality, and are the ones, even if they survive operation, that have given incomplete amelioration, and given rise to criticisms. So this paper is extremely opportune, and I am glad Dr. Crile has presented it.

Dr. J. W. Long, of Greensboro, North Carolina.—I believe it would be appreciated if Dr. Crile, in closing the discussion, would

give a brief resume to the association of how he deals with these severe cases of extreme hyperthyroidism. I rise to make that request of him.

Dr. James E. Moore, of Minneapolis.—Just last week, when discussing this topic with an eminent neurologist of St. Paul, he made a rather sneering remark with reference to the operative treatment of exophthalmic goitre. He said: "I never have less than half a dozen cases under treatment that have been cured at Rochester by operation." I replied: "Yes; but, doctor, you do not see the hundreds of cases that have remained cured. You see a few. We all acknowledge our failures." Again I said to him: "When do you refer these cases to the surgeon?" He replied: "I do not refer them at all." That shows the animus of his discussion. He is prejudiced. He is one sided. I rise simply to emphasize one point made in my paper yesterday, that while surgical intervention should be the last resort in the treatment of these cases, it should not be a late resort. If the medical men working with us will conceive that there is a place for surgery in these cases, and will give us a chance at an early enough date, we will deliver the goods.

Dr. J. A. Crisler, of Memphis.—I think the members of this Association are practically all agreed that there is a time—and that time is early in the disease—when operation for cases of exophthalmic goitre is always applicable, and I feel that in this day of enlightenment, if these patients are operated on early, they will derive benefit from the operation. It seems to me, the point is not *how* to do the operation, but *when.*

Dr. August Schachner, of Louisville.—In the first place, I wish to thank Dr. Mayo and Dr. Crile for their papers, and to call attention to what was to me one of the most interesting papers upon this subject. I refer to Kocher's Nobel prize essay. In this essay he gives a very graphic and clear description of the obscure forms of hyper- and hypothyroidism. When we study any subject we cannot strike it in the middle and go both ways. We must begin at the beginning or from the end and work back. I would recommend to the members of this Association this particular essay of Kocher as throwing much light in helping to find these cases early and to recognize the early conditions of excessive and insufficient amount of thyroid secretion. Kocher says that you have got to know about how much thyroidal secretion each individual should have. That is largely the key to the situation.

Dr. Mayo (closing the discussion on his part).—I will take this opportunity to use a part of the time in discussing Dr. Crile's paper, and will then say a word in closing the discussion on my own paper.

As regards the question of the etiology of exophthalmic goitre or simple goitre we know little. We do not know any more about the cause of exophthalmic goitre than we used to know about the germs that produced fevers, and it does not make so much difference except so far as preventive medicine is concerned. We will know something about the etiology of this disease, and when we shall have arrived at that period much may be expected from preventive medicine.

An author in a recent article claims the French prize of 1500 francs on account of his ability to produce goitre in animals. He considers exophthalmic goitre a microbic condition, and goes into the question of myxedema and cretinism, and really has a good deal of support in the cases of cretins that he reports.

In the last one hundred years of medical treatment of exophthalmic goitre we have made little progress. Nearly every conceivable thing has been employed therapeutically for the purpose of trying to bring about a cure of this disease. Medical men have picked out the type of cases that were either getting well or likely to get well, but in all these years there has not been a single thing that the medical men themselves could agree upon. If you were to ask them about the medical treatment of this disease, they would give you half a dozen different methods they had used, and some of them would report the benefits which they thought the patients had derived from this or that special line of treatment. Without present knowledge of this disease, it has reached a stage in surgery when, if we get the cases sufficiently early, we can operate on them with a mortality that amounts to nothing. But there is a decided difference in judgment as to the time the surgeon operates and the method he employs in doing the operation, and grading the steps of the operation. Today we must take up the question from every standpoint, and particularly we must consider the secretion, as has been mentioned by Dr. Crile. It is not one element in the secretion, but several elements which act on the nervous system, on the heart, on different organs, and in the end we must divide the whole thing up again into a variety of conditions. We have a true pathological condition that can be shown in every one of these cases, and it will harmonize with

the clinical facts, and we must separate the particular type of tumor, as shown in the hyperthyroidism. For example, we cannot cure brown atrophy of the heart muscle, nor can we influence the changes that go on in the pancreas and in the suprarenals by operation. Somewhere between 1 and 4 per cent. of patients will die from operation. In the last series of cases operated on in St. Mary's Hospital there were 180 operations for exophthalmic goitre without a death. In our first series many years ago there were 4 deaths in 16 cases, 1 dying on the table. I would not touch such cases today in the same period of activity.

This is a medical disease in certain stages, but medical men should not go on treating these cases until they are so far advanced that surgery can do little or nothing for them. The medical man and the surgeon should work hand in hand in the management of these cases.

Dr. Crile (closing).—I feel today, as I have felt before, so far as the mortality is concerned, that the question is solved. Dr. Mayo has said so many things that pleased us all, that my reply must necessarily be very weak or insignificant. But I want to point out one other source or measure which we can follow which will help to recommend early operation, and which I think will cause the general practitioner to change his viewpoint. I refer to the patients who have been cured. Who was it that forced the early operation for appendicitis? The cured patients. I find the strongest advocates I have of operation for exophthalmic goitre are the patients who have been cured, and I find that an increasing number of patients are sent to me not by the physicians in charge, but by the patients themselves who send some other patient along with the physician.

In reference to this disease, perhaps I might add a word to what has been said with regard to Kocher. Last summer he asked me about the plan I had devised for patients to be operated on. I told him the plan I had been using, and he said he had not done that, but he said: "I keep my patients in the hospital for a long time; they come from a distance, and they are kept until they beg and plead for an operation; then the operation is performed under local anesthesia." I told him that it was quite necessary for me to adopt other measures, as I did not have the great confidence of the public in reference to goitre cases that he or Dr. Mayo enjoyed, but for myself,

I preferred to take no chances in failing to gain the confidence of patients at the last moment, and that what I did was the following: patients come for operation with the belief that they can be cured. At the first interview I talk over the problem with them very frankly. I tell them that not every case of Graves' disease requires operation; that the best results are achieved if a patient will go into the hospital and take the routine treatment; that if an operation is necessary we will not discuss that problem again, because it excites the patient. She is told that if she will place her case under our care, we will decide whether operation shall be done or not, and whether it will give the best results. That is nearly always satisfactory to the patient because she becomes excited if you talk operation too much. She enters the hospital, and is placed in the service of nurses and doctors who are trained in a certain way to take care of her and who gain her confidence. We watch the patient for a few days and notice whether any changes take place in the disease in order to get at the factor of safety in the case. If this patient complains of headache or a dry throat, we give her inhalations. We anesthetize these patients at a certain hour in the morning, say at nine o'clock, give them an inhalation of oxygen, or nitrous oxide gas, with the nitrous oxide apparatus, and day by day, after they are given an inhalation for a few minutes, almost every patient will tell us that she is greatly improved. This, I believe, influenced by the psychic factor and by gaining their confidence, improves their condition. The morning of the operation, breakfast is omitted and the patient is given a small dose of morphine-scopolamine to make her quiet. The shades are drawn and the patient is left in quietude, and so on preparation is made except this fictitious anesthesia. The gas inhalation is nitrous oxide, which the patient does not and cannot notice in breathing it, and she falls off to sleep in bed. An orderly waits outside with a car, the patient is picked up, and taken to the operating room. The neck is prepared. The patient, up to that time, has had no psychic strain or shock at all. There has been no strain or shock from the anesthetic from this point on. I cannot elaborate the cause of it, but under inhalation anesthesia if you divide tissue of any kind in Graves' disease there is an enormous sensitization to trauma. A little injury that causes harm to a normal person may cause a thousand times more harm to a patient who has Graves' disease. You block the

entire field of operation with novocaine. The result is the patient passes through the operation without knowing when she took the anesthetic. She will not know that an operation has been performed, and that saves the body weight the damage which has been called hyperthyroidism. We do not find an increase in the pulse rate, however severe the case may be, and where a deep ligation is resorted to it is done in bed. We let them fall asleep with nitrous oxide and use local anesthesia, and take out the gland and tie one artery, the left one usually; then wait to see the effect of the left ligation. If a metabolic change is apparent, we ligate the right artery. If a metabolic change is apparent, we progressively go up until we have removed the lobe. You must know that in a case of Graves' disease shock is produced by, for instance, the news of a death of a friend, and a recapitulation of that bad news, should the patient hear it day by day, has a bad effect upon her. If you can take a patient and perform a short operation without any psychic shock, that patient will commence to get well faster afterward, and will not have a recapitulation, and the memory of her operating room experience to hold her back after the operation is over.

INTESTINAL OBSTRUCTION DUE TO GALL-STONES

WITH A REPORT OF THREE SUCCESSFUL CASES

By Frank Martin, M.D.
Baltimore, Maryland

The chief purpose of this communication is to present for record three successful gallstone ileus cases that have come under my personal observation. In all three cases the condition was serious, as the obstruction had existed until they were in a most perilous and hazardous way, and nothing but the timely aid of surgery would have been of avail. There is such an abundance of literature on this subject that at first sight it might seem to be a somewhat common ailment. Such, however, is not the case, as numerous statistics show. It is reported (Edward[1]) that up to 1910 there had been but 250 recorded cases. Bradbury[2] states that from 1893 to 1896 in the Rochester Royal Infirmary there occurred but one case of this kind from a list of 50,000 patients treated. The rarity of this interesting complication of the surgery of the biliary tract, together with the unique and complex findings in my last case, have been the chief incentive that has induced me to present these cases.

Case I.—*Gallstone ileus, complete; operation, October* 12, 1906. *Recovery.* Mrs. T. W., married, aged fifty-nine years. I was called by Dr. W. W. Cissel to see this patient who was ill with an acute abdominal malady, the diagnosis of which was uncertain. The patient was a stout woman with a large abdomen; her symptoms were more or less continuous pain, constant vomiting which had recently become stercoraceous,

associated with inability to have the bowels moved. Previous history obtained was that she had had numerous bilious attacks, which had occurred during the last twenty years. Of late these attacks had been fewer in number and less severe in character. Present illness began September 30, with acute abdominal pain and vomiting. The vomiting continued until October 3, when there was a slight let-up, but she was still nauseated and could take no nourishment. She was up and about, although complaining. On October 7 she had another attack, vomiting ugly green material, and she went to bed. The vomiting persisted more or less continuously from this time. This and the inability to have the bowels moved were the chief symptoms. The vomiting finally took on a stercoraceous character, and abdominal soreness and pain increased. There had been a slight rise in temperature, but this had subsided when I saw her. I could make out no definite evidence of appendicitis; there was some muscle stiffening; no evidence of visible intestinal coils; no definite localized mass; some slight tenderness over the gall-bladder, but nothing to make one think of cholecystitis. She was much flushed in the face; pulse was not rapid but weak; and she showed evidence of marked general weakness, due to lack of nourishment, which she had been unable to take practically since September 30. No definite diagnosis could be made other than possible intestinal obstruction from some cause, the symptoms of intestinal obstruction being present, namely, persistent colicky pain, persistent vomiting, and coprostasis. I am free to confess that gallstone ileus did not enter my mind, as I had never seen a case. The chief point was that she needed immediate help, and this was given by laparotomy.

Operation. The abdomen was opened through a right rectus incision above the umbilicus, the incision placed here because I thought that the trouble could probably be located in the upper or middle abdomen. When the peritoneum was opened, a lot of fluid, slightly tinged with blood, came out.

The small intestines were deeply congested and ballooned, so that it was evident she had an obstruction from some cause. A hand was placed in the region of the gall-bladder, but nothing could be made out there, and the appendix was normal. Passing the hand over toward the mid-line, a mass was felt in the small intestine, which at first conveyed the impression of being a carcinoma of the small intestine. Pulling it into the wound, I found it was an obstructed small intestine, the point of obstruction being about five feet from the ileocecal valve. The loops of small intestine proximal to the blocking were enormously distended, and the loops distal to this point were markedly collapsed and tape-like. It was seen that the obstruction was due to a foreign body, which was tightly impacted in the lumen of the intestine, completely obstructing it. It was so hard and rigid that no impression could be made upon it; I tried several times to force it from its lodgement, but the blunt end of the stone was forward, and it had some rough spicules, as will be seen from the specimen. My idea was to push it into the large intestine, but this was impossible. After the bowel was tucked off with gauze, a longitudinal incision was made and the stone delivered. Although there was deep congestion of the upper bowel proximal to the obstruction, at the point of impaction the bowel wall was in a recoverable condition. The proximal loop was not emptied, but the current was arrested by gauze being tied around the loop until the stone was removed. The opening was then closed by a continuous Connell suture, with Lembert sutures over it, and there was no diminution of the lumen at this point. Following the closure, the fecal current was then allowed to pass on, and it was seen to go from the ballooned to the collapsed portion, showing that the obstruction was entirely removed. A protective drain was put down to the point of incision in the bowel, and the abdomen closed around it. This was done for fear there would be leakage, and also because there was much peritoneal fluid present.

The patient was considerably shocked, due to her exhausted condition, and normal salt solution was given her. She reacted well and made an uninterrupted recovery. The vomiting ceased immediately after the obstruction had been removed. A recent report from her doctor states that she is enjoying excellent health, and has had no further gallstone or obstructive symptoms.

I am unable to say, in this case, where the portal of entry from the gall-bladder to the intestine was, but from the size of the stone I should judge it to be through a gall-bladder-duodenal fistula.

Case II.—*Gallstone ileus, complete; operation, December* 11, 1909. *Recovery.* Mrs. B., aged sixty-two years; referred to me by Dr. H. M. Slade She was a stout woman with a very large abdomen. Past history: Apart from vague symptoms referable to the upper abdomen, there were no definite symptoms pointing to gall-bladder disease. Present illness: She came under my care December 9, with a history of having had definite symptoms of intestinal obstruction for ten days or two weeks, the symptoms abating only to recur. The vomiting, pain, and inability to have the bowels moved would subside and then come on again. The family were very loathe to have anything done, and postponed any operative procedure as only a *dernier ressort.* When examined by me the cardinal symptoms of obstruction were noted, namely, pain and vomiting, tympany, and arrest of bowel contents. Abdominal palpation revealed nothing specific. There was no definite point of tenderness, and no marked stiffening of the belly wall. A diagnosis of obstruction without giving the cause was made, and I operated December 11.

Ether was given; a low right rectus incision made. Distended, congested small intestines bulged out into the wound, and a lot of dark, turbulent, slightly bloody fluid came out of the peritoneal cavity. A search through the abdomen was made for the point of obstruction, and as the hand passed down into the abdomen, a hard mass was felt in the small

intestine—so hard and rigidly held in the bowel wall that I at first thought of an annular carcinoma of the bowel. When the loop of intestine was gotten up, it was seen to be due to a foreign body, tightly impacted, and completely blocking the lumen of the bowel. The point of blockage was in the lower ileum, about six or eight inches from the ileocecal valve. It was impossible to budge the stone from its position, and pushing it on was out of the question. The bowel was well packed off, and a linear incision, just opposite the mesenteric border, was made and the stone removed. There was some escape of bowel contents, and soiling of the peritoneum in consequence, and there was considerable dark bloody fluid in the pelvis, so it was decided to put in drainage. Two cigarette rubber tissue drains were inserted, and the wound closed around them. The patient was placed in Fowler's position, and normal salt solution given. Vomiting ceased, the pain abated, and she made an uninterrupted recovery.

Case III.—*Gallstone ileus (strangulation) associated with an ulcerating process which produced an anastomosis between the lower ileum and the bulbous appendix, with the third loop of the ileum caught over the mass by a localized peritonitis, and the second anastomosis found in this loop of ileum. Operation October* 7, 1911. *Recovery.* Mr. S. M., married, aged thirty-six years, farmer. There is nothing in the past history that bears upon the present condition. Present illness began October 2, 1911, with severe vomiting; this became expulsive in character and later stercoraceous. Abdominal pain, which was a pronounced symptom, was controlled by morphine, which was given by the doctor. Bowels did not move from Monday until Friday, when there was a slight movement, resulting from high enema. He was brought to Baltimore on Friday, and was first seen by Dr. H. B. Thomas. He was given castor oil and an enema, but these were not effectual; his vomiting was still voluminous and markedly stercoraceous, and, as the intestinal patterns became apparent, I was called in. The clinical picture was that of a pronounced

mechanical intestinal obstruction. The man was exhausted from persistent vomiting; he had a small pulse, not very rapid; no temperature; and the facial expression was that of pronounced exhaustion. The abdomen was markedly ballooned; and in the upper abdomen visible coils of intestine were noted. At the time that I saw him peristalsis was visible in these patterns. He was a slender man, with thin abdominal walls, and this was easily seen. A diagnosis of advanced obstruction was made, and he was sent to the Union Protestant Infirmary.

Operation. This was performed within an hour after I first saw him. Low right rectus incision made; greatly distended and congested loops of small intestine came into view, and a quantity of murky, bloody serum welled out. The ballooned intestines were packed off (in order to keep the intestines within the abdomen, as evisceration of the intestines adds so largely to the element of shock); the cecum was found to be collapsed, as was the ileum in the immediate neighborhood of the ileocecal valve. A hand was passed down in the iliac region, and a hard (stone-like) mass was palpated. It was about the size of a small apple, and adherent below the brim of the pelvis, just over a little to the outer side of the right iliac vessels. This mass consisted of coils of small intestines tied together by adhesions, due to local peritonitis, with a hard mass in the lower ileum, which proved later to be a gallstone. This was the point of obstruction, as likewise the point of strangulation, in the segment of bowel distal to the point of blockage. The small intestines proximal to this point were greatly distended and congested, while distal to the point they were collapsed. On separating adhesions a loop of ileum, about six inches from the ileocecal valve, was freed, and an opening was noted in it (as shown by Fig. 4). This communicated with the centre of the mass by an anastomosis. The opening in this first loop was closed with purse-string sutures of fine silk, and the loop tucked aside. In continuing the separation of the

adhesions, over and around the mass, a large anastomotic opening was found between apparent adjacent coils of ileum. In this anastomosis was found a large gallstone, lying partly within the ileum and partly within what proved to be a bulbous appendix. This point of blockage was eighteen or twenty inches from the ileocecal valve. An ulceration had occurred, making this opening between the ileum and the appendix, and a local peritonitis had caught this above mentioned third loop, perforating it. In consequence of this inflammatory process angulation took place, and complete strangulation of the bowel at the point distal to the blocking occurred. The appendix was gotten up and removed. The opening in the ileum could not be attended to while it was tied to the side of the pelvis by dense adhesions and so deeply placed. By freeing the adhesions, the loop was gotten up, and the strangulated segment freed (it appeared as though constricted by a tight band). The opening, which was over an inch long, was closed with a running suture, and a few interrupted Lembert sutures were placed over this, thus completing the closure. The lumen of the bowel was not diminished at this point. Some contamination occurred before this opening could be closed. The zone of strangulated bowels seemed to be sufficiently viable to not interfere. After releasing the strangulation and closing the opening, the lumen seemed to be re-established, as noted by the contents of the ballooned portion passing into the collapsed portion. In view of the contamination, pelvic drainage was deemed expedient, and a rubber tube, the size of my little finger, was placed in the pelvis, along with several iodoform rubber tissue tucks. The abdomen was closed except at the lower angle, where the drainage came out. The patient was somewhat shocked; 700 c.c. of salt solution was given under the breast during the operation.

After History. The vomiting stopped at once, and the following morning his condition was favorable—pulse 80, normal temperature, and draining well. In order to over-

come the toxemia, which was the chief feature in the case, he was given continuous salt solution, placed in the Fowler position, and nothing allowed by mouth for thirty-six hours. He made an uneventful and uninterrupted recovery.

History. Gallstone ileus, although rare in its occurrence, is an old subject. Bartholin,[3] in 1654, published a case of perforation of a gallstone from the gall-bladder into the jejunum. Many interesting cases have been reported since that time. Murphy,[4] in a recent article, divides the subject into two distinct periods—first, that which precedes the appearance of the epoch-making article of Courvoisier in 1890, and second, from 1890 to the present time. In the first period gallstone ileus was distinctly in its infancy, but since 1890 it has been purely within the borderline of surgery. Courvoisier justly deserves credit for having directed surgical endeavor in the proper channels. His work was indeed a masterful production. The forcible way in which he presented pathological problems having to do with gallstone disease in its various locations gave him world-wide recognition. He is credited with having done the first successful pioneer work in common-duct stones, having performed three successive successful operations in 1890. His book, with its voluminous statistics, has been quoted more generally than any other; but I think he is probably best known by the law which is given his name—Courvoisier's[5] law. The law briefly stated is as follows: "When the common duct is obstructed by a stone, dilatation of the gall-bladder is rare; when the common duct is obstructed by other causes dilatation of the gall-bladder is common."

The truth of this law is far-reaching, and it is one of the most certain in surgery. Its chief value lies in that it distinguishes the curable from the incurable, the operable from the inoperable, the lithogenous from the non-lithogenous cases. Cabot,[6] in 1901, called attention to the widespread neglect of it, and stated that it was curious indeed that a law of such value whould have been so slow in penetrating the

minds of American physicians and surgeons. This was shown by the fact that most American writers on medical and surgical aspects of disease of the gall-bladder either made no reference to the facts emphasized by Courvoisier, or made statements directly contradictory to that which had found general acceptance in England and on the Continent.

The monumental works of Langenbuch, along with Naunyn, Kuemmel, Riedel, Kocher, Fenger, Mayo Robson, and Treves, have added so much of value that they must not be overlooked.

Frequency of Occurrence. This form of obstruction, as compared with other causes, varies markedly according to the statistics given by the various authors: 1 to 15 (Fitz); 1 to 28 (Lichtenstern); 1 to 17 (Gibson). Mayo Robson[7] states that in the four largest hospitals in the United Kingdom, for a period of twelve months, in the 80,000 in-patients and several hundred thousand out-patients, there were but four cases of intestinal obstruction due to gallstones. Records of the Johns Hopkins Hospital, together with the Union Protestant Infirmary and St. Agnes, show that out of a total of 280 cases of obstruction, there was found but one due to this cause (Bloodgood[8]). Barnard[9] reports a series of 8 cases from the records of the London Hospital, covering a period of eight years. These were selected from 360 cases of intestinal obstruction from various causes, making the frequency of gallstone obstruction in this series of cases 1 to 45. Of the 8 cases, 3 recovered and 5 died. An interesting fact is that in four of the fatal cases the postmortem showed a gall-bladder-duodenal fistula between the neck of the gall-bladder and the first part of the duodenum, explaining the portal of entry of the calculus into the intestine.

In view of the varying statistics, I have endeavored to get further data regarding the frequency of the occurrence of cholelithic obstruction. I received personal communications from a given number of prominent surgeons, selected at random, and from the 28 heard from, I was able to collect

but 16 cases. These surgeons are men who have had long and active careers, and their cases are to be numbered in the thousands. It would be safe to say that each of these 28 men would number a thousand operations a year, and doubtless their experience covers at least twenty years; so that, grossly speaking, from the number of 540,000 cases there occurred 16 cases of gallstone obstruction. Of the 16 cases, 11 died and 5 recovered, making the mortality about 69 per cent. The average age was about fifty-five years, agreeing with Courvoisier's statistics. From six of the leading surgeons of this city I was able to collect but 4 cases. Two of the men who had had the longest and most active careers had never seen a case. Of the four collected there was but one recovery and three deaths. The figures show not only the rarity, but also the high mortality following operation for the relief of the same.

Courvoisier's statistics show that the average age is between fifty and seventy years. Of the 3 cases which I am reporting, 2 occurred after middle life. It occurs about five times more often in females.

Method of Entrance of Calculus into the Intestinal Tract. This is of great interest, as likewise is the fate of the gallstone in the intestine. There is often found a clean history of gallstone disease in these cases, but in the majority of the cases there is no previous history of trouble of this kind. Stones large enough to produce obstruction usually find their way from the gall-bladder into the intestine not by the natural passage. The pathological process of various entrances may be analyzed in the following way:

1. First and foremost, by the extension of the inflammation from the gall-bladder. The stone passes through the wall of the gall-bladder into some portion of the intestinal tract.

2. By being blocked in the common duct, and the extension of the inflammation continuing, ulceration forms an anastomosis between the common duct and the intestinal tract through the duodenum.

3. The same process occurring by anastomosis between the cystic duct and the intestinal tract.

4. The stone may pass through the cystic duct and the common duct on into the bladder by dilating the latter.

5. The stone may gain entrance into the transverse colon, and, if so, pass out without producing symptoms of obstruction.

The entrance of large gallstones through fistulous openings into the intestines occurs oftener than has been suspected, and the possibility of its occurrence must not be forgotten. In fact, we must conclude that the occurrence of intestinal obstruction, after the passage of gallstones from the gall-bladder into the intestines, is surprisingly frequent, owing to the large size of these stones. Courvoisier reports ileus in 28 of 73 cases, or 38 per cent. These openings occur between the posterior surface of the neck, body, or fundus of the gall-bladder into the first part of the duodenum, namely, that part of the duodenum which is so often bile-stained at autopsies.

A gall-bladder-duodenal fistula is more frequently found than an opening in the colon or other sections. Out of 30 fatal cases, 28 were due to gall-bladder-duodenal fistulæ, and only two to gall-bladder-colon perforations (Courvoisier[10]). There was but one between the gall-bladder and the ileum. It is emphasized by Courvoisier that stones large enough to produce ileus with rarity ulcerate through the choledochus wall. He further called attention to the fact that at the end of the eighteenth century there were but 9 cases of gall-bladder-intestinal fistulæ recorded, while three times as many cases of intestinal obstruction due to gallstone had been reported. This fact shows the unsuspected frequency of associated inflammatory and ulcerative processes in many of these cholelithic obstruction cases.

The Vagaries and Wiles of Cholelithiasis. The devious ways and paths through which stones have been found to wander, as exemplified in many reported cases of

cholelithiasis, is most interesting, and have been the cause of much complex pathology, viz.: They have been passed through the urethra, as in a case of Elsner's.[11] Postmortem disclosed in this case a fistulous track leading from the gall-bladder to a perinephritic abscess, this extending to the right kidney where a stone was found, one having passed by the ureter to the bladder and on out. An abscess may continue to perforate downward, and the stones in this way perforate directly into the urinary bladder. Courvoisier reports 7 cases of urinary fistulæ associated with gallstones. Barroud[12] reported a case where 200 stones passed the urethra within eight days, and the patient recovered. Naunyn reports a case in which Mikulicz operated for pyloric stenosis, which was supposed to have been caused by an ulcer. A large gallstone was found forming the base of the ulcer. Morgagni[13] reports a case in which the common duct was dilated to the size of the stomach, and filled with stones. Such enormous dilatations of the common duct may readily be mistaken for pancreatic cysts—all the more so, on account of the topographico-anatomical relations of the common duct to the pancreas, and also from clinical experience secondary affections of the pancreas have been proved to depend upon gallstones.

Numerous cases have been reported where they have ulcerated into the stomach and have been vomited up. Case 124 of my series exemplifies and explains the pathology of this condition clearly.

Case 124. Mrs. M. E., aged forty-three years. Operation, October 21, 1909. She had trouble referable to this region off and on for many years. Operation disclosed an anastomosis between the gall-bladder and the stomach, showing that a gallstone later would probably have anastomosed through the ulceration into the stomach. This case explains the condition found in those cases on record where gallstones have been vomited up.

Diverticula back of the head of the pancreas have been

found to contain stones, passing out from the cystic duct. Diverticula in the intestines have been their hiding place. There may be a lodgement in the intestine at the site of a malignant growth, or in the appendix of the smaller stones. An abscess in the thigh of a woman revealed them (a case of Porges), and so on. In Case 27 of my series there was a biliary fistula opening on the abdominal wall.

Case 27. P. M., aged sixty-seven years, male. Operation, October 21, 1904. He had had a biliary fistula opening on the abdominal wall for fourteen months. There was a continuous discharge of bile, and at various intervals a number of gallstones had worked their way out. Operation disclosed a stone in the common duct, as well as others in the gall-bladder. Cholecystectomy was done, with recovery of the patient.

So it is readily seen that the fate of the gallstones in the intestines varies. I have mentioned above some of its vagaries. Fifty per cent., after long-standing obstructive symptoms, pass *per vias naturales.* The rest, after varying intervals, with repeated recurring attacks, depending upon the advancement of the stone, become finally arrested, and, if not relieved, generally produce perforation and peritonitis.

Numerous cases have been reported to me where they have been passed spontaneously. I am incorporating one case, as given to me by Dr. H. C. Algire, of Baltimore, which is of interest at this point:

Patient was a short, stout woman, aged seventy-two years. She had an acute onset of severe abdominal symptoms of the complete obstruction type, after having given a history of mild obstructive attacks for a number of months preceding. Her condition grew desperate, and her life was despaired of. After ten days of complete obstruction, while she was lying in a stupor, the bowels moved copiously, and it was seen that a large gallstone was passed. She gradually returned to consciousness and recovered. She lived five years after this, without further evidence of this trouble.

THE SITE OF IMPACTION. In all of the reported cases it seems to be borne out that the principal location where the stones are blocked and produce ileus is in the lower ileum, that is, the greatest percentage is found in the lower ileum. Courvoisier's analysis of 52 cases shows this very clearly, as well as the other points of impaction:

Duodenum	3	
Jejunum	4	
Upper jejunum	1	
	—	8
Upper ileum	4	
Middle ileum	1	
Ileum	18	
Lower ileum	10	
	—	33
Ileocecal valve	7	
Vermiform appendix	2	
	—	9
Sigmoid flexure	2	
	—	2
Total		52

MANNER IN WHICH OBSTRUCTION IS PRODUCED. In gallstone ileus there is either partial or complete interference with the onward movement of the contents of the bowel. In the former there will be well-defined symptoms of obstruction which may or may not be severe in character. As the movable mass finds difficulty in its progress, or produces further spasm of the intestinal wall, these attacks of ileus are repeated. It should be remembered that the interior of the small intestine, unlike the colon, is covered with the folds of the valvulæ conniventes, so that a large, rough calculus, with angular surfaces is apt to meet with difficulty in finding its way along such a canal; which difficulty is further increased, due to the anatomical fact that the small intestine becomes narrower from its upper to its lower end. These attacks recur with greater violence until the stone passes the ileocecal valve and escapes *per vias naturales* or else becomes arrested in the lower ileum, the most common seat of complete blockage. It is with this form of gallstone obstruction

that the present paper is alone concerned. As a rule, calculi produce intestinal trouble within a few days after reaching the intestine, but as to the time obstruction may come on after the stone enters, it is purely speculative. Cases have been reported where the stone was assumed to have remained in the bowel ten years (Eve's), reported by Treves.[14] Mayo Robson cites a fatal case where the stone weighed only 55 grains.

The common type of gallstone ileus is usually unassociated with strangulation, and in the majority of cases reported it is clearly understood that there is an impaction of a large concretion in some part of the intestinal tract, producing a mechanical block. In a given case, however, we may have three varieties of ileus:

1. Adynamic: due to a paralysis, from some cause, of the peristaltic wave of the intestine.

2. Dynamic: which depends simply upon the failure of the abdominal wall to overcome the resistance offered. The spasm beneath and around the calculus is the chief cause of the obstruction.

Mechanical: (*a*) Obturation ileus, which is an arrest from blockage of the onward movement of the fecal current; (*b*) strangulation ileus, which involves not only the arrest of the intestinal contents, but the arrest or interference with the circulation in the bowel segment involved. The bowel soon loses its viability, as is shown in Case 3 of my series. Inflammatory changes in the lumen rapidly occur, and, consequently, these cases are much more rapidly fatal than in the obturation type of mechanical ileus.

Extensive research work in this field, done by Bouchard, Albu, Clairmont, and Ranzi, in connection with the cause of the mortality in these cases, points to auto-intoxication as the prolific cause, and they are of the opinion, with Kukula,[15] that the reflex theory of the symptoms of ileus is no longer tenable. They are strongly of the opinion that the symptoms of collapse and depression are entirely due to auto-intoxica-

tion. There are others, however, who hold strongly to the belief in other elements as the cause of these deaths.

Symptoms of Intestinal Obstruction. The clinical history may or may not show evidence of preëxisting gallstone disease—cholecystitis, stone in the various ducts, etc. In a large percentage of the cases, however, the history shows some evidence of disturbance in this region. The symptoms of tenderness and pain associated with fever may have occurred at some previous time, incident to the ulcerative process at the time of the escape of the stone from the gallbladder. In many cases no such symptoms are elicited, and in others only vague symptoms of colic, bilious attacks, etc., which have occurred through a period of a number of years previous to the onset of the obstruction, with or without jaundice.

When the ileus occurs there is always present in the picture the cardinal signs which embrace a definite syndrome of symptoms, consisting of pain, nausea, vomiting, coprostasis, and tympany. In all outspoken cases these are present, one or more varying in intensity with each individual case. There is a history of gradual, rather than sudden, onset, unless the point of blockage is high up in the ileum or jejunum. In such cases there is sudden onset, associated with intense pain and marked peritoneal shock, and early fecal vomiting, without much distention. Pain is the most conspicuous, most common, and most pronounced symptom of the group. It is always severe and constant. It is of a colicky character, subsiding at times and then recurring, as the fatigued intestinal muscles recover their peristalsis and make further efforts at expulsion. Although always pronounced, it is not as severe as the pain that accompanies strangulation. The pain is due to the tension and torsion of the nerves of the mesentery (Lennander[16]).

Vomiting is persistent throughout. It appears at the beginning of the attack and continues uninterrupted until the obstruction is relieved. The higher up the obstruction, the

Fig. 1.—Gallstone causing intestinal obstruction (Case I). Operation, October 12, 1906. Recovery.

Fig. 2.—Gallstone removed in Case II, gallstone ileus. Operation, December 11, 1909. Recovery.

Fig. 3.—Gallstone removed in Case III, gallstone ileus with strangulation. Operation, October 7, 1911. Recovery.

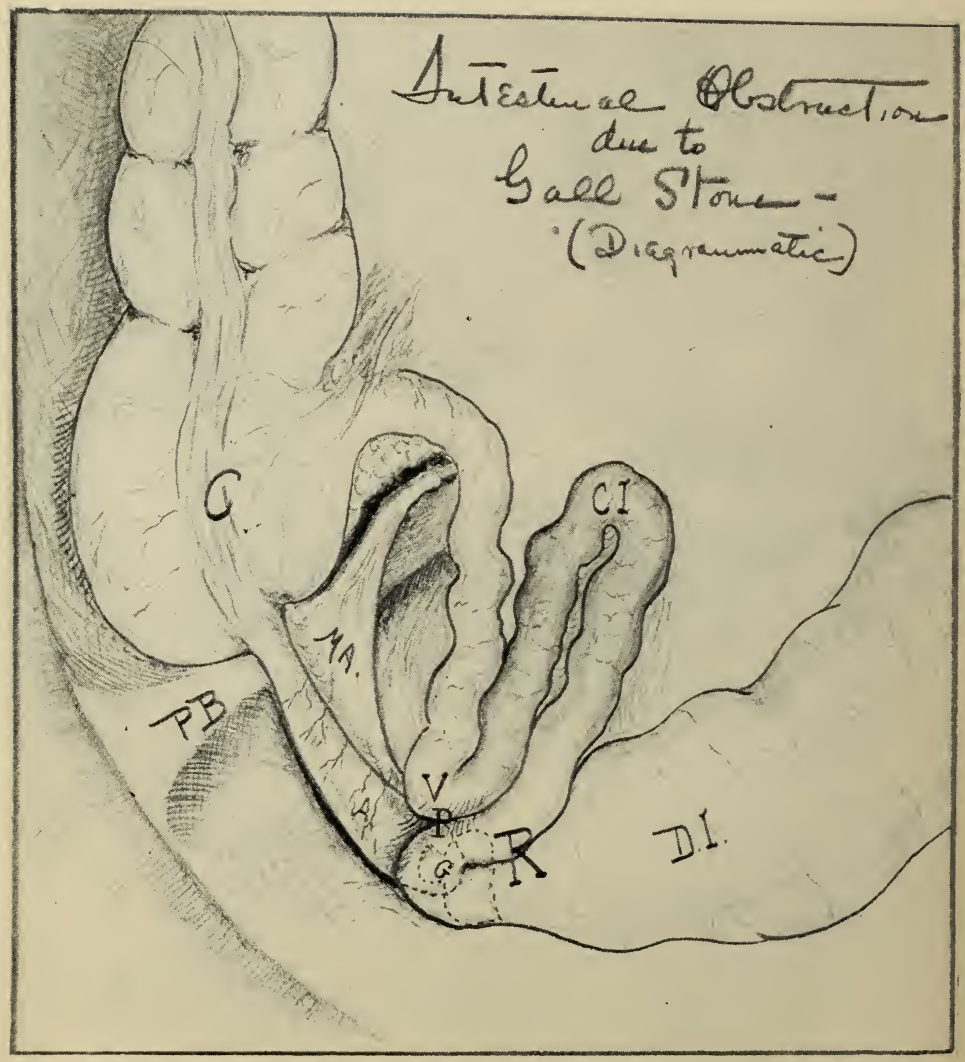

FIG. 4.—This illustrates diagrammatically Case III, gallstone ileus with strangulation: *C*, cecum; *A*, appendix; *CI*, collapsed ileum; *DI*, distended ileum; *PB*, pelvic brim; *V*, ileum kinked and adherent at point of obstruction, *R*, and partially separated to show perforation, *P*; *R*, point of obstruction, appendix and ileum perforated by gallstones, *G*; *MA*, meso-appendix.

Fig. 5.—This illustrates diagrammatically Case III, gallstone ileus with strangulation, showing the three openings in the different sections of bowel after the parts were separated: *DI*, dilated ileum, proximal to the point of obstruction; *G*, gallstone in the lumen of the ileum with a portion of it projecting out through the opening which had formed by its anastomosis with the appendix; *CI*, contracted ileum, distal to the point of obstruction; *V*, second opening in a different section of the ileum, which was found when the adhesions were released and that loop of bowel freed; *X*, opening in the bulbous appendix where a portion of the stone had rested after it ulcerated through from the ileum.

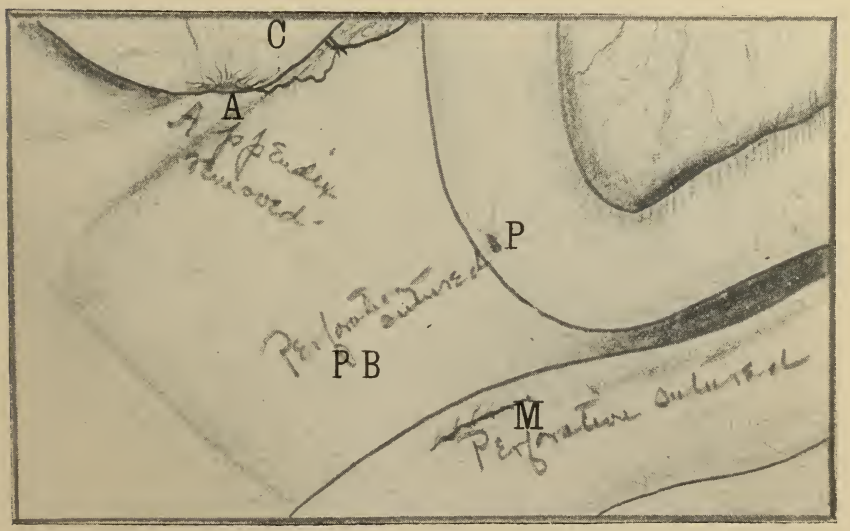

Fig. 6.—The condition after the stone was removed and the anastomosis closed and the appendix taken away: *C*, cecum; *A*, appendix removed; *PB*, pelvic brim; *P*, perforation at *P* closed; *M*, perforation at point of obstruction closed.

more marked the vomiting, the more incessant, severe, and copious. In a short while it becomes stercoraceous, which is not due to the reversed peristalsis as was formerly thought.

In a complete attack of ileus, there is complete arrest of the fecal current. This is absolute as far as the passage of feces and gas is concerned. This condition is interpreted in a very confused way; by many it is thought that if a high enema brings some results, there cannot be an obstruction. This often is the chief cause of delaying operations.

Local tenderness is not, as a rule, elicited by pressure of the examining hand, as in cases of obstruction from other causes. It is chiefly of use as an aid in cases of peritonitis. Limited tenderness may appear and be of some diagnostic value. The blocking stone is seldom palpable. Diffuse tenderness generally means the onset of peritonitis. In most cases the evidence gained by the examining hand is of much importance, as it aids in the differential diagnosis.

The stiffening of the belly muscles and the marked universal spasm and rigidity which is noted in peritonitis are generally not noted in acute intestinal obstruction. Tympany and meteorism are markedly pronounced in some cases, but usually not so marked as in acute strangulation types. When visible peristaltic loops are seen, they are of great aid and point very clearly to mechanical obstruction, as there is generally an absence of visible peristalsis in peritonitis. There is usually an absence of temperature, and high leukocytosis is present. *X*-ray examination up to the present time is of no special value.

Many cite with confidence an array of symptoms which points to the diagnosis of gallstone ileus, but, for my part, I think that we can only suspect from the symptoms a possible gallstone ileus, and that we cannot diagnosticate with certainty a case of this kind.

Differential Diagnosis. The diagnosis of gallstone ileus is seldom made with certainty. Many acute cases, having to do with gall-bladder surgery, simulate obstruction

very closely. This occurs in the experience of every operator. Acute gangrenous cholecystitis, acute empyema of the gall-bladder with pericholecystitis, acute common-duct obstruction—in many such cases I have seen all the symptoms of acute obstruction, which immediately cleared up following operation for the relief of the same.

Many acute conditions of the abdomen have to be considered in the cases that present themselves: peritonitis from its various causes, obstruction in the ureters, acute pancreatitis, acute torsion of an ovarian pedicle with its inflammatory symptoms, acute appendicitis, etc. So that many times the best that we can do is to recognize early that there are obstructive symptoms, and not waste time in speculation as to the cause but give surgical aid as promptly as possible. There is no condition in surgery so imminently calling for early help as intestinal obstruction from any cause. Although it is stated that in 50 per cent. of the cases the stone is passed spontaneously, one assumes a highly dangerous supposition when he assumes in a given case of stone obstruction that they will adopt that course, and in consequence a waiting or expectant plan of treatment is resorted to with the probable loss of the patient's life and the late operation credited with the mortality.

Mortality. The disease is a peculiarly fatal one. Out of 280 cases collected by Schuller (of Strasburg), Dufort, and Courvoisier, 156 died. Other statistics place the mortality at about 50 per cent. The mortality after operation has been in the past very high, due, I gather, to the late resort to surgery. Naunyn makes the statement, after considering the results of 13 operations for ileus due to gallstones, of which number there was only one recovery, that laparotomy is not to be recommended. Langenbuch, on the contrary, took a different view. He made the unqualified statement that gall-stone obstruction is a surgical disease, the treatment of which is to be intrusted to the physician only during a very short period.

The statistics give varying figures as to the mortality following operation. Lobestein found out of 31 cases operated upon a mortality of 61 per cent.; Courvoisier out of 125 operations found a mortality of 44 per cent.; Schuller found out of 82 cases of operation a mortality of 56 per cent. Korte is reported to have saved four out of five consecutive cases. The present-day statistics that I have collected, unfortunately, still give a high percentage of mortality, namely, 69 per cent. The advanced age of the patient, the fact that the operation is undertaken as a last resort, and the long-standing auto-intoxication are the chief reasons for this high mortality. It varies within such wide limits, however, as to make it impossible to draw any conclusions of value. Suffice it to say, that the mortality is always high, for the reasons mentioned, and is unquestionably highest in the hands of those surgeons who operate late. I wish to emphasize that this high percentage of mortality at the present time should be considered a disgrace, although the surgeon is not responsible for it. The mortality from operation should be *nil,* and will be *nil* if the internist in the future will have his cases operated upon early, and not let them drag through repeated attacks of obstruction until they are practically all-in, before surgical aid is sought.

Operation. This is our only means of correcting the difficulty, and so should be given as promptly in each individual case as possible. Delay in this condition is more fatal than in any other lesion. General anesthesia is to be preferred when the condition warrants it; if not, a local anesthetic may be used. The incision is usually placed in the right or left rectus, and the obstructing point sought with as little evisceration as possible. If the loop can be brought up to the surface, the bowel should be opened and the stone removed. The question of pushing the stone onward is usually not feasible, and it is far more dangerous than delivery of the stone through a longitudinal or transverse incision in the bowel wall. The putrid contents of the dis-

tended loop should be emptied preferably through a Monk's tube. This obviates in many cases the fatal issue, by doing away with further absorption of the decomposing, retained products. This is an important point, and should be made use of invariably. From personal communications that I have received, the cause of death in their cases has been attributed to neglect of this point. The opening in the bowel can be easily closed by a Connell and Lembert suture, and the bowel dropped back into the abdomen. If the segment of bowel at the point of obstruction is still viable, this is all that is needed; if not, a resection will have to be done, and either an end-to-end or lateral anastomosis be made. Drainage is needed, in my opinion, if there has been much soiling of the abdomen at the time of the operation and if the peritoneum contains much bloody fluid. I regard this as important, and usually make use of rubber tube drainage placed well into the pelvis, and the abdomen closed around it. The patient should be put in Fowler's position, and proctoclysis begun as soon as the patient is returned to bed. These steps have been made use of in the three cases presented.

I wish to emphasize this point—that the toxemia in these cases is the chief factor to be combated, and we can do this best by thoroughly washing the stomach before operation, thoroughly draining the distended loop above the obstruction at the time of the operation, and giving freely and abundantly salt solution both at the time of the operation and afterward—intravenous if necessary, or intracellular in all cases, along with salt solution by rectum. I believe if these steps are followed, more lives will be saved, even if the operation is resorted to late.

Bibliography

1. Edward. Practice of Medicine.
2. Bradbury. British Medical Journal, September 25, 1897.
3. Bartholin. Obstetrics, 54, p. 243.
4. Murphy. Illinois Medical Journal, September, 1910.
5. Courvoisier. Beiträge zur Pathologie chirurgie der Gaggenwegen, Leipzig, 1890.
6. Cabot. Medical News, November 30, 1901.
7. Robson, Mayo. Diseases of the Gall-bladder, p. 90.
8. Bloodgood. Personal communication.
9. Barnard. Annals of Surgery, 1892.
10. Courvoisier. Loc. cit., p. 104.
11. Elsner. Medical News, February 5, 1898.
12. Barraud. Pelletan and Barraud, Pelletan (Barraud, Batillat.), Jour. de Chimie méd. de Pharm. et de Toxicol., 1836, 2 ser., t. ii, pp. 593–600, 653–669.
13. Morgagni. German Clinic, Neusser of Vienna.
14. Treves. Intestinal Obstruction, 1900, p. 366.
15. Kukula. Mitteilungen aus d. Grenz. d. Chir. u. Med., 1906, xvi, 19.
16. Lennander. Mitteilungen aus d. Grenz. d. Chir. u. Med., 1906, xvi, 19.
17. Cant, W. J. Cases of Obstruction of the Small Intestine by Gallstone, British Medical Journal, 1897, October 20.
18. Carl, R. Ueber Darmverschluss durch Gallensteine, Inaug. Diss., Freiburg, 1905.
19. Delber et Gueniot. Occlusion intestinale par valcul biliarie, Bull. et Mém. de la Soc. anat., 1900, No. 4.
20. Briddon. Intestinal Obstruction by Gallstone, Annals of Surgery, January, 1897.
21. Bogdanik. Darmverschluss bei Cholelighiasis, Wiener med. Presse, No. 45, 1902.
22. Brunke, Alfred. Ueber Darmverschluss durch Gallensteine, Inaug. Diss., Kiel, 1898.

PRIMARY SARCOMA OF THE GALL-BLADDER

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Notwithstanding the enormous amount of literature relating to diseases of the gall-bladder and the immense amount of surgery that has been done on this organ, one is struck by the comparatively few cases reported of primary sarcoma of this viscus. Malignant disease of the gall-bladder is by no means rare and practically all of the cases of primary malignancy reported are of the carcinomatous variety. Rolleston reports in his work references to only 9 cases of primary sarcoma of the gall-bladder. Is it the case, as the literature indicates, that sarcoma is rare, or is it due to the fact that we are interested only in the results of surgical achievement and have not reported our pathological findings?

The *American Practice of Surgery*, vol. viii, states:

"Primary sarcoma of the gall-bladder is rare and of comparatively little surgical importance. In 1889 Musser found but 3 reported cases. Since then others have been reported—one of the spindle-celled variety by Rolleston and one specimen of melanotic sarcoma in the Hunterian Museum referred to by Robson."

A recent search in the library of the Surgeon-General's office reports the following cases:

Sarcoma of Pancreas, Liver, and Gall-bladder, reported by Dr. Ingalls in *Boston Medical and Surgical Journal*, 1878. Case was that of a woman, aged fifty-five years. Autopsy showed a primary sarcoma involving the gall-bladder, head of pancreas, and right lobe of the liver.

At the meeting of the New York Society of German physicians, held September 23, 1881, Dr. Seibert reported a case of a man, aged fifty years, with primary sarcoma of the gall-bladder.

There are 7 other cases reported in German papers in the years 1881, 1897, 1904, 2 in 1908, 1910 and 1911. All the patients were over fifty years of age, and autopsies revealed the involvement of the gall-bladder by primary sarcoma. Four of these 9 reported cases were operated upon.

In all of these cases, with one exception, as well as in others reported, stones were found in the gall-bladder, showing a far greater proportion of the presence of stones than in those cases reported of secondary involvement, which would seem to indicate that no matter what theory is adopted as to the etiology of malignancy the presence of foreign bodies tends to have an influence whether by reducing the resistance of a part causing stasis and thus rendering it more liable to local infection, or by constant irritation increasing the cell proliferation.

If the above is correct, could not the greater frequency of malignant disease of the gall-bladder over that of the vermiform appendix, which is also subject to the presence of foreign bodies, infection, etc., be explained not only as Rolleston suggests by "the fact that the appendix is an atrophying relic of part of the gut, while the gall-bladder belongs to the very extensively developed appendage—the hepatic diverticular of the duodenum," but also by the great difference in the blood supply of the two parts and the greater functional activity of the gall-bladder.

On June 6, 1909, a case was referred to me for operation with a probable diagnosis of gallstones. The man was forty-five years of age, fairly developed, but had a slight cachectic or septic look. His history was as follows:

About four years previous he began to have severe pains over pit of the stomach, which appeared at irregular times

and had no special connection with eating. These pains were quite severe and seemed to radiate to the back; vomited at times; no rise in temperature. On May 4, 1909, a month previous to operation, he had a sudden, sharp, stabbing pain in the right side, most marked along the border of the seventh rib. This lasted from two to four hours and opiates were taken for relief from the pain. He had repeated attacks similar to this which came at irregular times. He had no chills but a slight rise of temperature and a marked localized tender spot on pressure over the seventh right intercostal space in the midclavicular line. Also, some tenderness over the angle of the seventh rib on the right side. He stated that it took him a week or ten days to recover from the prostration of each attack. He had lost about 25 pounds in weight during the year. The bowels moved regularly, his stools being normal in color. Heart, lungs, and kidneys normal. Liver dulness extended rather higher up than normal. Gastric analysis negative.

On opening the abdomen through a gall-bladder incision a large mass of adhesions was found. The liver was small and well above the costal margin. The edges of the liver and gall-bladder were attached to the seventh intercostal space and eighth rib by dense adhesions. The gall-bladder was surrounded by a large mass of adhesions and was adherent below to the omentum, head of the pancreas, and duodenum. The whole mass felt hard and nodular. A search of the other viscera showed no involvement or deviation from normal. There was no perceptible involvement of the lymphatic glands. The gall-bladder and adhesions were dissected from below and then from above. A small pocket of pus was opened and in doing so also the gall-bladder. Three stones were found within the cavity, and the gall-bladder walls very much thickened, hard, friable, and necrosed. The gall-bladder was removed and a drain fastened in the cystic duct and another drain placed in the kidney pouch. The patient made a quick recovery and

experienced relief from all symptoms. Reports from him over a year after the operation state that he is in good health, has had no return of the symptoms, and there is no evidence of metastasis.

This report is made that the case may be added to those few reported of primary sarcoma of the gall-bladder. Its surgical interest is only that this patient is alive and in good health, doubtless due to operation at an early stage.

The following is the pathological report of the specimen removed as submitted by the pathologist, Dr. F. B. Johnson, upon which the diagnosis of primary sarcoma of the gall-bladder was made:

Operation: Cholecystectomy.

Macroscopically. Mass about the size of an egg, reddish brown in color externally; on section yellowish gray. Fairly firm in consistency and from general outline it is seen to be made up of the sac of the gall-bladder, the walls being, in part, about 2 cm. thick.

Microscopically. Sections stained by hematoxylin and eosin show large numbers of fairly large, round sarcoma cells, some spindle cells, and a few small round cells. Most of the cells show an abundance of cytoplasm, their bodies being somewhat variable in shape, more polygonal and oval than round in outline. The nuclei are ovoid shape, mostly clear and distinct, some, however, staining lightly and others very intensely. To the latter class belong especially those cells approaching those of the round small-cell type.

Some of the cells show mitosis and others apparently contain two nuclei, this being noticed in those of the larger round-cell type.

A moderate number of medium-sized spindle cells with elongated nuclei are seen in distinctive areas, the cells in a great many instances showing some fibrillation.

The cells on that side of the growth which originally

formed the inner wall of the gall-bladder stain poorly, showing considerable necrosis, degeneration, bile staining, and some pigmentation. The reticulum throughout is fairly well seen except in some dense areas where the cells are closely packed. The connective-tissue stroma is scarce.

Some of the more delicate bloodvessels only show an endothelial lining, surrounded by sarcoma cells, especially of the smaller type. The larger vessel walls are fairly well marked. Many areas scattered through the growth show rather extensive extravasation of blood. The growth appears to have no capsule.

In places the growth seems to have involved the whole gall-bladder wall. In a few places, however, the three layers can be made out and the growth is seen to invade chiefly the middle or fibromuscular coat. The mucosa lining of the gall-bladder has disappeared, but glandular areas can be found lined with columnar epithelium.

The three gallstones with the specimen, one the size of a filbert nut the other two considerably smaller, were found to be composed of cholesterin with small amounts of calcium salts and bile pigment.

References

Dr. Ingalls. Boston Med. and Surg. Jour., 1878, xciii, 601 to 603.

Dr. Seibert. Medical Record, New York, January to June, 1882, xxi, 299.

Destrèe. Sarcomatous Transformation, Bull. Soc. path-anat. de Bruxelles, 1881, xxx, 129 to 132.

Griffon and Segall. Sarcoma of the Gall-bladder Extending to the Liver, Bull. Soc. anat. de Paris, 1897, lxxii, 586.

Landsteiner. Sarcoma of the Gall-bladder, Wien. klin. Woch., 1904, xvii, 163 to 165.

Parlavechio. On a Case of Primary Sarcoma of an Emphysematous Gall-bladder, Arch. f. klin. Chir., Berlin, 1908, lxxxvii, 365 to 379.

Arheiner. Case of Primary Sarcoma of the Gall-bladder, Gaz. Med. de Strassbourg, 1908, lxvii, 81 to 83.

P. Hotes. A Case of Primary Sarcoma of the Gall-bladder, 8°, Leipzig, 1910 (Leipzig Dissertation).

Brunner. Primary Sarcoma of the Gall-bladder, Correspondence f. Schweiz, Aerzte Basel, 1911, xli, 71.

DISCUSSION ON THE PAPERS OF DRS. MARTIN AND CATHCART

Dr. James E. Thompson, of Galveston.—In connection with the first paper on obstruction of the alimentary tract by gallstones, I should like to relate an extremely interesting case that came under my observation four years ago. The patient was sixty years of age, and had been treated for many years for ulcer of the stomach. Suddenly, and without any warning, symptoms of complete obstruction of the pylorus made their appearance. After these symptoms had lasted almost a week, I was called in consultation and operation was advised. After the abdomen was opened, we found a mass of adhesions matting together stomach, duodenum, omentum, and the under surface of the liver. These seemed to surround a hard mass that had all the appearances of malignancy. While manipulating this mass to see if we could proceed further with the operation, something slipped from its centre into the hollow of my hand, which was grasping the stomach. It proved to be a large gallstone which was removed successfully by a simple gastrotomy. The stone was a large one measuring an inch and a half in its long diameter, and about an inch in its short diameter. It was evidently obstructing the duodenum completely, and had probably only recently passed out of the gall-bladder through a fistulous tract. It is very probable that the stone lay partly within and partly outside the gall-bladder, otherwise there would have been no reason for it to have remained in the upper portion of the duodenum, for it was not unusually large as solitary gallstones run.

Dr. George Tully Vaughan, of Washington, D. C.—I want to discuss the first paper a little and incidentally to show a specimen. I am sorry I have to add one case to the mortality list in these operations for obstruction by gallstones.

This specimen was removed from a patient, seventy-nine years of age, who gave a very interesting history. She had been troubled for about a year with symptoms of gallstones. She had pain, and some two or three months before this operation she had vomited blood. She had two or three attacks of partial obstruction of the intestine. When she was referred to me the obstruction was complete. She was in a rather serious condition. In thinking of the various things it might be in making a diagnosis, gallstones suggested themselves, and

after going over the various other things, I decided that it was probably a case of obstruction from gallstones. I was much pleased to verify my diagnosis at the operating table. This stone had passed down through the intestine to within two feet of the ileocecal valve, and there it hung up, acting like an obstruction coming through a funnel. It could be easily squeezed back to a point two inches above where it hung up, so that I could operate through the portion of the healthy gut and remove it. The bowel was brought outside the abdominal cavity, and a great deal of fecal matter was evacuated so as to avoid an intoxication which was feared. The wound was closed. The patient stood the operation well. The pulse was 120, and I had strong hopes for recovery, but she died suddenly five hours after the operation.

As to how these stones get into the intestine it is difficult to say. According to Dr. Martin, there are four methods or ways by which they may get into the intestine, but, as he says, most of them get through by ulceration.

But I have seen one or two cases in which stones got into the bowel without ulceration. In one case I saw there was obstruction of the mouth of the common bile duct with stones, and the common duct above was dilated to enormous size, at least 2½ inches in diameter, and holding fully a pint of fluid. This case was published in *International Clinics.*

Dr. Joseph C. Bloodgood, of Baltimore.—With reference to the case of sarcoma of the gall-bladder reported by Dr. Cathcart, I would like to call attention to some of the pathological conditions of the gall-bladder that have in the literature been frequently called carcinomata, but are not.

I was interested some two years ago, when I removed with a curette in a case of chronic cholecystitis and pancreatitis a peculiar gelatinous material that looked like the gelatinous material which is seen on the surface of a colloid cancer of the large bowel under the microscope. It was called an adenocarcinoma. Fortunately before that time I read an article on Luschka's gland, and had become familiar with the hypertrophy of Luschka's gland. I found two reported cases of cancer cured after cholecystostomy. The gall-bladder was drained; a piece of the wall was removed, with the relief of a condition that was considered inoperable. The microscopic report showed carcinoma. The patient remained well for many years after the cholecystostomy, which precluded, of course, any

possibility of its having been a carcinoma. Then a few men reported cases of carcinoma of the gall-bladder after a routine examination of the specimens removed. I had an opportunity to see some of the sections by writing these surgeons. These cases were all instances of hypertrophy of Luschka's gland.

In the uterus there are similar hypertrophies of the glands of that organ that to one not familiar with the picture of cancer are looked upon as malignant, and hysterectomy may be done after scrapings for benign hypertrophy of the glands of the uterus.

In the uterus the differential diagnosis is of great importance, because an unnecessary hysterectomy may be done if one makes a mistake in diagnosis of these hypertrophied glands.

In the normal gall-bladder the majority of anatomists and histologists are unable to find any of the glands, because the little diverticula bound by epithelial and glandular cells are so small they are overlooked; but if the gall-bladder becomes dilated for any reason, just at the little sac there beside the cystic duct, dilatation of the gall-bladder is frequently continued to these little diverticula, just like the glands of the stomach, then they become branching glands, and they sometimes contain stones. Sometimes they perforate and a stone is found outside the gall-bladder. It explains those cases in the beginning of gall-bladder surgery where surgeons found small stones impacted about the gall-bladder. If the gall-bladder wall is large and thickened by chronic inflammation, these branching hypertrophied glands are mixed up in the chronic inflammatory tissue, and a section taken through them by one not familiar with the picture would be looked upon as a condition of carcinoma. It is very important to know that in reporting cases cured of carcinoma of the gall-bladder, that you are not dealing with a benign condition.

This case of sarcoma of the gall-bladder reported by Dr. Cathcart is remarkable because the patient has remained well since operation. We have a similar condition in inflammatory reaction, as Adami has expressed it so well. It may be in some cases due to oversufficiency, while in others it may be an insufficiency, and it gives rise to granulation tumors only. There are great numbers of young connective-tissue cells which are round and spindle cells, and it is almost impossible to differentiate them from the cells of sarcoma. Some patients after incomplete operations are said to remain cured, so that

when patients remain well after incomplete operations you become suspicious of your diagnosis of sarcoma. So I think these two conditions must be borne in mind in connection with the gall-bladder.

Dr. John B. Murphy, of Chicago.—I feel that I cannot allow Dr. Martin's paper to pass without some discussion. The principal points of this paper are the mortality of the disease, the recognition or diagnosis of the disease, and the technique, so far as the operation is concerned. But what he desired to emphasize more particularly I think, than anything else, is the mortality and to what that mortality is due.

We have this morning, and all through the session of this meeting, been considering the question of *mortality of operations*. I think we should consider the question of *mortality from the pathological condition* rather than the question of mortality from the operation. The operative mortality of this disease in the average hands is *nil*. The mortality of intestinal obstruction, like the mortality of so many other pathological conditions, is due to delayed operation. This, with the exception of the phase of strangulated hernia, is the one abdominal disease that stands out conspicuously before the whole profession, both surgical and medical, whose mortality has not improved in one-quarter of a century, *i. e.*, internal intestinal obstruction. That it has not improved in this long period I know, and I speak from knowledge of facts, and not from "reported cases." We operate for strangulated hernia, the technique has improved but the death rate has not improved at all as it should have. It is still large enough to make the profession blush. Why? Because the condition is not recognized or diagnosticated in time. For this we hold the general practitioner principally responsible. His position has been apologized for here on a few occasions. It has been stated that the surgeon is confiscating from the medical man that which is his own. This statement is not true. The medical man, as a pulse feeling, temperature-taking, tongue-inspecting automaton, must abdicate. The internist is coming back to his own in the next quarter of a century, and he is going to be what he ought to have been in the quarter century preceding—the great master mind of medicine, because he is going to be a diagnostician, and for that he will command and receive the confidence of the people, and from his knowledge of facts already obtained, he will receive the reward which superlative cerebration is entitled to and always will command.

The essayist has classified the symptoms of obstruction; he has classified the types of obstruction; he has attributed death after operation to the accumulation of toxic material above the point of obstruction, based on *experimental* observation, but which is not sustained by my *clinical* observation. If it be the material above the obstruction which causes death, then after obstruction we should have from obturation ileus the same percentage of mortality for the same duration of fecal retention which we have in strangulation ileus—not at all in consonance with the clinical facts. Obturation ileus can continue for five or six or seven days without materially hazarding the patient, often observed in the chronic types of obstruction. Strangulation ileus enters the fatal stage at the beginning of the sixty-hour period, by this time cutaneous capillary cyanosis occurs. When we operate under these conditions the patient is likely to die immediately after the operation. This fatal condition is induced by other elements than the intoxication from the material above the point of obstruction, the increased absorption which takes place when the mechanical obstruction is removed.

Concerning the technique of the procedure and how life can be husbanded, I will say that some of the cases that are in the cyanotic capillary stage can be rescued by early and repeated washings of the stomach preceding the operation, by the use of intravenous saline transfusion during and synchronous with the operation, and repeated frequently after operation; the operation should be completed in the shortest possible time under these physically depressing conditions.

Dr. Martin (closing the discussion on his part).—I have nothing further to say except to agree with Dr. Murphy, that the high mortality is due to the fact that many of the cases of intestinal obstruction are referred to the surgeon too late.

In my paper I have incorporated what Dr. Murphy has referred to, although he does not agree with the other research workers on the subject of intoxication. He looks upon some other condition as bringing about the shock, collapse and death.

Dr. Cathcart (closing).—I appreciate very much what Dr. Bloodgood has said. This specimen was examined by a competent pathologist, who realized the rarity of the case, and the pathological findings were confirmed by others. Furthermore, I want to say it is not too late for the patient to have a recurrence. I did not wish to convey the idea that he was cured, but I said he has remained well since the operation.

A CASE OF CONGENITAL GANGRENE OF THE RIGHT FOREARM, WITH SUCCESSFUL AMPUTATION, IN AN INFANT FIVE DAYS OLD

By Randolph Winslow, M.D.
Baltimore, Maryland

On June 3, 1911, I was consulted by Dr. T. H. Legg, of Union Bridge, Md., in regard to a baby three days old with congenital gangrene of the right forearm. The history of the case is as follows:

W. H. G., a baby boy, was born June 1, 1911, at full term. The mother was only eighteen years of age and healthy; the father twenty-five and also in good health. The grandparents were healthy people, and there is no history of any specific or tuberculous disease in the immediate family. The labor was natural and of twelve hours' duration; position of the child *in utero* L. O. A. Labor was unimpeded and the cord was not wrapped around the neck or arm, neither were any amniotic or other bands noticed. The head was born and the arm followed normally; the child was not cyanosed and cried lustily. Dr. Legg noticed that the right arm was gangrenous almost up to the elbow, with a distinct line of demarcation already formed. He expressly notes that there was no sign of cord pressure or of pressure of any kind. The child's weight at birth was 5½ pounds.

He was brought to the University Hospital on June 5, 1911, when five days old.

There was complete moist gangrene of the hand and

Fig. 1.—Congenital gangrene of forearm, child aged five days. Amputation without anesthesia. Recovery.

Fig. 2

forearm, which were considerably swollen, and a somewhat irregular line of demarcation had formed a short distance below the right elbow. It was not judged safe to administer an anesthetic, and the amputation was made at the elbow-joint without any anesthesia.

The child cried some, but bore the operation very well, and became quiet when supplied with a bottle of milk. He was sent back home on the next train, a distance of forty miles. He did well, gained weight rapidly, and the stump had entirely healed in three weeks. Unfortunately he died when two months old of cholera infantum.

The points of interest in this case are the early age at which amputation was done, and the etiology of the disease.

As to the first item I have not made any search of the literature in order to discover if there are earlier cases of amputation than the one here recorded, but I am not aware of any. The ability of a frail child of that age to undergo such a mutilating operation, without an anesthetic, is also noteworthy. It is possible that an anesthetic might have been well borne, but I feared to attempt it.

As to the etiology of the condition I am in entire ignorance. I am well aware that intra-uterine amputations have been observed, and are attributed to the constriction of the limb by encircling amniotic bands. Sometimes more than one limb is amputated in this manner, and Playfair in his *Midwifery,* published in 1880, figures a case in which all four limbs had been amputated *in utero.*

In the case I have just reported, the attending physician, a man of exceptional ability, has specifically stated that no pressure by the cord or by bands was present.

Of course there may have been a thrombosis or embolism of the vessels of the arm, but what would have caused such conditions?

The gangrene was not of the dry or anemic type, but was more of the obstructive type. The forearm and hand were swollen, discolored, and offensive.

DISCUSSION

Dr. John B. Murphy, of Chicago.—I must apologize for discussing an obstetric paper, but I have been interested in this class of cases. Do you remember, Dr. Winslow, what was the condition of the lumen of the artery at the point of amputation?

Dr. Winslow, of Baltimore.—I did not have time to investigate, Doctor.

Dr. Murphy.—I have here a skiagram showing a fetus *in utero.* The patient came to me for examination and for the purpose of differentiating as to whether there was a tumor present with the fetus or not. I estimated the etiology of the condition present preceding delivery. If you will look at this skiagram you will see the fetus *in utero,* it being the first one made by Dr. O'Donnell, of Chicago. It is striking! When the patient came for examination September 1, 1911, I recognized a sharp projection in the left hypochondrium, which I interpreted as the hand or foot extending far in front of the occiput. That was a striking feature. This object was pressing up to the left side and could not be pressed closer to the head. The rest of the fetus was easily outlined, and the case diagnosticated as one of pregnancy, although the woman believed she had passed beyond the usual time for delivery. The wall of the uterus was so thin that it was questionable as to whether it was an abdominal pregnancy or not; it did not contract on manipulation. The question arose, Why was the hand held in that position, and particularly the right hand? In this skiagram the bones are clearly outlined. The right hand is not only held in that position, but there is a bony ankylosis of the elbow, keeping the hand in front of the face *in utero.* Delivery occurred six weeks later under the supervision of Dr. Fredericks, of Joliet, Ill. The labor was of short duration, buttocks presentation. The child came unaided. The arms were extended above the head as it passed through the lower straits. No effort was made to draw them down. The cord was twisted around the neck, but it was not noted whether it included the arms or not. The child suffered but little cyanosis. It was noted by Dr. Fredericks that both arms were paralyzed and that there were annular depressions showing the existence of previous constrictions of both arms just below the axilla. I happened to be in the city the following day and made a

Radiograph (slightly retouched). Ankylosis of elbow diagnosticated in utero. Seven and one-half months.

somewhat hurried examination of the child. The arms rested close to the baby's side, were motionless and all muscles were atrophied: on the right more than on the left—the latter being twice the size of the former. There was a complete absence of cutaneous or muscle reflex, either in the muscles of the arms or shoulders, and a flaccid paralysis showing that the lesion was in the lower motor neurons and not of cerebral origin. I know the strangulation was not due to amniotic bands around the arms as the deltoids were involved, which could not be caused by these bands on the arms. There was an annular depression in the neck just above the clavicles. Whether this was due to the cord or amniotic bands I do not know.

In the evolution of the extremities, there is originally no joint up to about the sixth month. Here there was no joint formed showing that arrest of joint development had occurred early. The paralysis resembled, but was not, an Erb's paralysis. The patient was the wife of a dentist, and a very intelligent woman, but could not recall an incident or accident during gestation to explain the condition. I believe the paralysis and ankylosis were due to a compression by the cord wound either across the shoulder and around the arms, or around the neck and arms. The brachial plexus in the embryo is very much exposed to compression at the neck, much more so than the carotid vessels and jugular vein. Compression in either of these positions would account for the elbow ankylosis, but the arm constriction would not account for the condition of the deltoid and shoulder group of muscles. The latter could only be accounted for on the pressure theory by compression above the clavicle.

Dr. Miles F. Porter, of Fort Wayne, Ind.—With reference to the ankylosis in this case, is it not a fact that there is no joint formed; that there is an arrest of development rather than an ankylosis of the joint?

Dr. Murphy.—It is a continuation of bone, as no joint had ever formed. Ankylosis means abnormal immobility at a point where a joint should be, regardless of its etiological factor. It is a continuation of an embryonal condition always present in the pre-joint formation period.

Dr. Robert T. Morris, of New York City.—One point in regard to anesthesia. I do not see any objection to using hydrochlorate of quinine and urea as an anesthetic in a case of this sort.

Dr. R. C. Coffey, of Portland, Oregon.—What is the objection to using ether in a case of this kind? In all cleft palate cases that come to me for operation, or to which my attention has been called immediately after birth, I operate upon them, if possible, within the first two weeks, and I find they take the anesthetic just as well as the grown one.

Dr. Winslow (closing).—I am thankful to Dr. Murphy for his remarks. He always adorns any subject he discusses.

With reference to the anesthetic, I did not want to kill the patient, and that is the reason I did not use ether. I was not taking any chances at the time.

In regard to the use of hydrochlorate of quinine and urea, it seemed to me that without using a local anesthetic I could make a rapid cut around the margins at the line of demarcation and make the separation. At any rate, this child bore the operation very well.

WHEREIN THE DIAGNOSIS OF PELLAGRA IS OF SURGICAL IMPORTANCE

By Le Grand Guerry, M.D.
Columbia, S. C.

The medical profession of America owes a very distinct and, at the same time, a great debt of gratitude to Dr. J. W. Babcock, of Columbia, South Carolina, for first calling attention to the existence of pellagra in this country; he not only called attention to the malady, but described it, named it, recognized it, and proved its existence. Until a short while ago this disease was only known as a curious name printed in some of our text-books; now we know that the disease has existed in this country for nearly one hundred years; we know that in some sections, especially in the South, the number of cases has reached almost epidemic proportions. The condition is of such importance that both the State and Federal governments, in many instances, are working together in an effort to solve the riddle of its cause. Before I can be justified for bringing such a subject as this (generally thought of as entirely medical malady) to the attention of a special surgical organization, two things must be proved: (1) That pellagra is of general interest; in support of the first proposition, we submit the following: That pellagra is of interest to medical men living in States other than the strictly Southern States is proved by the fact that cases have been reported from and are known to exist in about thirty-eight States of the Union; for example, Massachusetts, New York, New Jersey, Pennsylvania

(at the Philadelphia Hospital for the Insane, Blockley, a very interesting focus of infection has been discovered), Kentucky, Iowa, Kansas, California, Ohio, New Mexico, and Colorado. At the present time there are at least 300 cases in the State of Illinois.

Dr. C. H. Lavender, one of the government men detailed to investigate this problem, says that 25,000 is a very low estimate to place on the number of cases existing in America today. To make a long story short, pellagra exists from the Atlantic to the Pacific and from Canada to the Gulf of Mexico. This is no careless statement but an accurate one entirely susceptible to demonstration and proof; a disease, therefore, so widespread, must surely be of general interest to the medical profession; we feel safe then in announcing the general proposition that pellagra is of such interest and leave it with you to determine whether or not this part of my case has been made out. (2) It is now incumbent upon me to show, surgically, that there are cases, quite a number of them both acute and chronic, that can be and are mistaken for surgical conditions.

Pathology. This is from an autopsy report of one of Lombroso's cases. Edema malleoli and decubitus. Cerebral convolutions slightly atrophic; floor of fourth ventricle anemic, heart and aorta slightly dilated; aortic segment thick; lungs edematous; spleen and liver congested, both had spots of fatty degeneration. Kidneys soft; cortical substance very thin. Bowels atrophic; muscular coat and intestinal mucosa very anemic; hypertrophy of the salivary gland; mesentery glands reddened.

Spinal Cord. The inside dura appeared to be polished; the pia was thick and opaque, especially on the dorsal surface; on the arachnoid were many hard, small plaques that resembled bone. Meninges were hyperemic. The consistency of the cord was decreased in the cervical region, the gray matter resembled, on section, commencing decomposition. Microscopic examination of the cord showed

degeneration of the pyramidal tract. This lesion was symmetrical from the site of the fifth pair of cervical nerves and increased as it descended the cord with maximum at the lumbar vertebræ. On this pair very few nerve fibers were preserved, the nerve fibers being replaced by sclerosed nerve tissue. The posterior columns are very slightly affected and limited to the column of Goll and a few fibers of the column of Burdach. This degeneration stopped at the first cervical nerves where the sclerosed nerve tissue could not be seen. The ganglion cells of the gray matter, especially on the anterior cornu of the dorsal region, were atrophic, very pigmented. The principal pathological lesion was in the spinal cord, and the pyramidal tract had suffered most; next the ganglia, as well as of the anterior cornu."

Symptoms. I shall give a very brief description of the symptoms and refer those interested in this subject to a splendid article by Dr. Watson on the "Symptomatology of Pellagra," published in the *International Clinics,* vol. i, series 20. The symptoms here given are culled almost entirely from this paper.

First Digestive Disturbances. "The buccal mucosa become very red, the tongue and mucosa of lips showing particularly this characteristic symptom. If the throat is examined this redness will be observed as far as one can see into the pharynx. Flakes of exfoliated epithelium will be seen adhering to the gums, and the tongue, being denuded of its epithelium, is smooth and glistening, its color being a cardinal red and it being a cardinal symptom of the disease. I have denominated it the cardinal tongue."

Stomach. Stomach symptoms may at times be most pronounced. "The acme of the stomatitis corresponds in point of time and severity to the acme of the eruption on the hands. Other mucous membranes are also inflamed, proctoscopic examination revealing a bright red mucosa as far up the gut as can be seen." (Watson.) There are also gastric crisis, with occasional hemorrhage.

Diarrhea. Diarrhea is almost always present during some part of the disease, varying in intensity and degree; sometimes the stools contain both blood and mucus.

Pupil Symptoms. Pupil symptoms are at times very marked and pronounced in their variations, due probably to the involvement of the ciliospinal centre, which is situated in the cord between the first and second dorsal vertebra, a part of the cord always involved in the disease.

Temperature and Pulse. Temperature and pulse depend upon the severity of the infection; high temperature and rapid pulse belonging to most malignant and fatal infections.

Psychic Phenomena. "Briefly, mental depression is as constant as the erythema and diarrhea, and varies from a mild case of the 'blues' to severe melancholia." (Watson.)

Skin Eruption. The skin eruption is characteristic of the disease; the only trouble about the eruption is that it is frequently a late symptom and occasionally does not occur. If it were a constant and real symptom, mistakes in diagnosis could hardly occur. It is an erythematous rash, closely resembling sunburn and occurring on back of hands and faces exposed to the sun.

So much, then, for the symptoms, now to our real undertaking; a malady with the symptom complex of digestive disturbances, stomach symptoms, diarrhea, psychic phenomena, etc., can in the atypical case be mistaken for anything. We know, for example, that the poison of pellagra is especially liable in women to involve the female pelvic organs. "In the early cases we have all the train of symptoms: backache, pelvic distress, headache, bearing-down pains, weakness, lassitude, emaciation, ovarian and menstrual disturbances, which are seen in pelvic disease, for, as Manton well says, mental symptoms are present in gynecological cases.

When the eruption is not present, the unsuspecting doctor or consultant is most likely to pronounce the case pelvic

and treat the symptoms as pointing to a primary gynecological trouble without thinking of its being a part of the pellagrous symptomatology. Here, too, the mental depression is regarded as merely a symptom of the pelvic disease and operation or special treatment is advised. The consultant neglects to ask for a history of the eruption for one year, or maybe for four or five years, and at the same time there is perhaps a very red tongue, swollen and indented with stomatitis, which he overlooks or diagnosticates and treats as ptyalism and disregards the severe wasting diarrhea with increased knee-jerk, pupillary anomalies, marked atheroma, enlarged epitrochlears, dorsal pain, and "nervous dyspepsia." I am compelled to say that cases of so-called postoperative insanity admitted to this asylum point to this conclusion, for in the spring and summer of 1908 we had, as we do every year, many such cases which showed all these symptoms of early pellagra and gave histories of former eruptions and diarrhea. To cite an unusual occurrence, but striking coincidence, in one week, we admitted 5 cases of pellagra which had been operated on for gynecological trouble within the preceding two months and all of these at the time of admission had or developed within a month, the typical objective pellagrous stigmata. Three of these five died and two went home recovered, according to Dr. Saunders, of our State Hospital for the Insane.

It has been known for three hundred years that pellagra can and does cause uterine hemorrhages, varying from mild to a very severe degree. Old women, for example, not only in this country but abroad, have had hysterectomy done for pellagrous hemorrhage under the false diagnosis of cancer. In this connection I cannot resist this question; how many neurotic and much-operated-on women, the proverbial gynecological cases who have suffered many operations, including a D. and C., R. T. O., suspensio-uteri, etc., movable organs fixed and fixed organs removed, still not relieved, may be chronic pellagroms? I have personal

knowledge of a number of such cases. My experience is as follows:

Case I.—Mrs. ——, aged forty years, married, several children, was sent to the hospital for diagnosis and operation if necessary. There was marked anemia, loss of flesh and emaciation; hemoglobin, 30 per cent.; there was definite pain and rigidity over the pylorus; blood in the stomach contents and in the stools; no tumor could be felt; the gastric analysis showed positive interference with motility, blood, entire absence of hydrochloric acid.

We considered such a case as having symptoms sufficient to warrant an exploration, this was done; all that was found, however, was a red and inflamed stomach and intestinal tract; the case was closed. Several days later when the patient was rolled on the porch and placed in the sunshine the typical eruption was brought out on her hands. Drs. Babcock and Watson were called in consultation, with the result that the case was finally pronounced pellagra, which diagnosis was correct. The patient was sent home and died several weeks later presenting a classical picture of pellagra.

Case II.—A young, vigorous child taken suddenly ill with acute abdominal pain, with general abdominal tenderness and rigidity, but most marked over McBurney's point. Temperature, 102°; pulse, 120. Two pellagra experts saw this case and advised operation; on opening the abdomen the appendix was found slightly inflamed, but entirely inadequate to explain the severity of the constitutional symptoms; five days later when the eruption occurred the real cause of the trouble was revealed. This case recovered.

Case III.—Mr. ——, middle-aged man, with a history extending over a number of years of some chronic abdominal trouble; he had been under the treatment of numerous doctors and I saw him in consultation with a doctor of unusual ability and who was an expert in the question of pellagra; for some time previous to the consultation he had developed symptoms that, to us, seemed to indicate

clearly either a high-up chronic appendix or an inflamed gall-bladder; as every other means had failed to give relief operation was advised and accepted; although the appendix was removed and the gall-bladder drained, all of us felt that what was found did not explain his trouble; he was kept in the hospital for a long time under observation; while there he developed a very mild pellagrous rash on the back of his hands, which settled the question of diagnosis. Proper dietetic and hygienic treatment directed by this medical attendant put him in better condition than he had been for years. This patient, a most intelligent and educated man, then wrote for us, in his own way, a history of his trouble for several years and it filled, exactly, into the symptom-complex of pellagra.

Another point of importance is that in the future we must reckon with pellagra as a causative factor in intestinal hemorrhage of obscure origin. We also have to look at these cases from the standpoint not only of diagnosis, but it is imperative to remember that these cases are living on a very narrow margin of safety, and that even when surgery is imperative for earlier conditions that may arise they are extremely poor surgical risks, and the mental symptoms can be and have been greatly exaggerated by anesthesia and operation; occasionally being followed by acute insanity from which they never recover, but die.

In conclusion, it is most important to keep in mind that there are both acute and chronic cases; cases with and without eruption; that the onset frequently is most insidious and atypical; that the disease is a malady as protean as malarial fever, tuberculosis, or hysteria. This final point we wish to emphasize that as our knowledge of pellagra, the disease increases and the pellagra zone widens we should keep in mind when dealing with cases similar to those given above the pellagra syndrome.

DISCUSSION

Dr. J. M. T. Finney, of Baltimore.—I am sure the members of this Association are greatly indebted to Dr. Guerry for bringing this subject before us. It seems to me, however, that he is adding to our troubles. In the future, we must now bear in mind pellagra in making a diagnosis in obscure cases, and for this reason I do not know whether we owe Dr. Guerry a debt of gratitude or not, as it seems to me we have trouble enough as it is. The first case of pellagra, I believe, that was recognized in Baltimore, was one which presented in the surgical clinic at the Johns Hopkins Hospital, and which for a time was not diagnosticated. It would not have been diagnosticated by myself, had I not just returned from Columbia, South Carolina, where I had visited Dr. Guerry, and had had the opportunity there of seeing a number of cases of pellagra with Drs. Babcock and Watson. Profiting by that experience I was able to make a diagnosis of pellagra. The patient had been admitted to the surgical side with some obscure infection which had not been recognized. I mention this because it was of surgical importance, and the patient doubtless would have been treated for something else, had we not recognized the true nature of the disease.

Personally, I was very much interested in Dr. Guerry's paper.

Dr. H. A. Royster, of Raleigh, North Carolina.—I am satisfied that this paper contains an important lesson for those who are practising surgery in the South and perhaps in all parts of the country. I have had very little experience with pellagra. I have seen, personally, very few cases of pellagra disease and never treated any, but I remember one case which was saved from an untimely operation at my hands by having first refused to be operated on by another surgeon, and then coming to me later with the well-developed symptoms of the disease. I doubt not I would have given the same advice, if I had not had the advantage of time which had elapsed between his visit and mine. This patient exhibited signs of trouble in the upper abdomen, and any one of us would have decided it would be proper to explore; but having waited two or three months, when she came under my care, she had a very decided and definite pellagrous syndrome. The history went farther back, and showed she had had pellagra for a number of years, but for a good while had been free from symptoms, as is often the case in the chronic varieties. In

talking with Dr. Watson, of Columbia, whom I regard as an expert in this disease, he said in his very graphic way, that many surgeons are going to open the upper abdomen in these cases and find some inspissated bile in the gall-bladder ("and where would you find inspissated bile except in the gall-bladder?") and be perfectly satisfied with the diagnosis and treatment until later the patient herself would develop the disease which was the cause of all the symptoms.

Dr. Charles R. Robins, of Richmond.—I plead guilty to having operated on a case of pellagra, and the facts in this case were: A woman who had been operated on several years previously for pelvic trouble, afterward developed symptoms which I felt sure were due to the appendix. These symptoms were referable mostly to the stomach, but she had typical tenderness in the right iliac fossa. When I was called to see her in an acute attack I was negligent in not paying attention to a rash on her arms. I had never seen a case of pellagra. I did operate on her afterward, and found she had an appendix that was markedly diseased. It was very much inflamed; it had three concretions in it, and it was adherent, and I thought the removal of the appendix would relieve the symptoms. After the operation she became melancholic, developed stomatitis, fever, and delirium, when the diagnosis, of course, was evident. In this case, however, the woman did have appendicitis, as was shown at the operation, but she likewise had pellagra and died a few weeks after the operation of an acute exacerbation of pellagra.

Dr. W. M. Jordan, of Birmingham, Alabama.—Dr. Robins has brought up a point that I desire to say a word or two about myself. It is quite probable that a patient with a chronic appendicitis or with pelvic trouble may develop pellagra as well as any other patient. In such a case, is there any reason why we should refuse to operate if the condition becomes troublesome? I had occasion to do that at one time, and I have no reason to regret the operation. The case was one of chronic tubal trouble in a woman who was known to have had pellagra for four years. I undertook the operation, and while she is not entirely well, yet she bids fair to recover from pellagra, and I have never been able to see the bad effects of the pellagrous symptoms. It is now a year and a half since the operation was done.

Dr. Felix E. Balbridge, of Huntsville, Alabama.—There is one thing that impresses me very much, and that is, a pella-

grous patient will have a great many symptoms pointing to pelvic trouble before there are any evidences of pellagra, and I do not know that I can illustrate this better than by reporting a case of my own.

I operated on a woman a little over a year ago who had symptoms of pelvic trouble. I suspended the uterus, and removed the appendix. She had had a chronic appendicitis, and a retroversion of the uterus, with no symptoms of pellagra. It never occurred to me that she had pellagra. After the operation she continued to gain in weight and health, but six months thereafter she had all the symptoms, which were very pronounced, of a pellagrous eruption on her hands, arms, symmetrically distributed, and on her face. She had the red tongue Dr. Guerry spoke of, and incidentally the vomiting of blood, and got into a serious condition, so much so that I thought she was going to die. At the request of the family, and at the urgent request of the patient, I gave "606," and for four months she improved remarkably, in that the eruption disappeared, and she looked as though she was going to get well. But in the last month her mind has gone all to pieces, she is almost insane, and is getting worse and worse.

Dr. Guerry (closing).—I have only a word or two to say in emphasis about this condition, and it is this: pellagra is a disease that is very apt to become chronic, leaving out of consideration the fulminating acute cases, because you have cases of that sort. You can have cases that will develop pellagrous symptoms; these will subside, and the patients will get into a chronic condition, and you will have the kind of symptoms you are looking for.

One important point is that these patients are very poor surgical risks, especially with the development of mental symptoms. Where operation has been undertaken, I have seen some of these patients come out of the operation in a profound state of melancholia and remain in that condition until death occurred.

One other point and I am through. I recall a patient who had a goitre, with a small thyroid gland. The question that arises in such a case is this, particularly where there are nervous and mental phenomena present, is the thyroid responsible for the condition? It is known that this patient had probably pellagra several years ago. That creates a most interesting situation, and it is an extremely important point to decide.

LIMITATIONS OF BONE REGENERATION AND RECONSTRUCTION

By John B. Murphy, A.M., M.D., LL.D.
Chicago, Illinois

In looking at the joint we have always considered it a very complex, difficult, and dangerous zone from a surgical standpoint, when, in reality, it is a simple, easily accessible, and a thoroughly safe field in which to work. When you look at the joint and consider the lesions that occur in it, you ask yourselves the question, What tissues are involved in these lesions? In the joint, from the standpoint of surgery or infection, you have essentially two tissues to consider—one the bone and the other the synovial membrane. The cartilage is never the seat of primary acute infection. The fibrous capsule of the joint is never the seat of primary acute disease. Therefore, the two tissues involved are the inner lining, the capsule, known as the synovial membrane, which is the primary seat of all of the hematogenous infections starting in that membrane; and, second, the bone, which is the seat of hematogenous infection occurring in the bone.

In the lesions of bone that occur in the neighborhood of joints in the child we divide them into two classes—first, those that occur in the shaft, and, second, those that occur in the epiphysis. In early infancy we never have primary infection in the epiphysis because it is not yet ossified. It is cartilaginous, and primary infection never takes place in cartilage. In early infancy we have infections of the tuberculous type always occurring in the end of the shaft. In

the adult, tuberculosis never occurs in the end of the shaft, but always in the epiphysis, on the joint side of the epiphyseal line. In the infections that occur in the ends of the shafts in children, they occur more commonly in Great Britain, and particularly in Scotland, than in any other country in the world. The point has been clearly brought out by Stiles, of Scotland, that acute infective osteomyelitis or acute osteitis is a lesion of the epiphyseal end of the shaft and never a primary lesion of the epiphysis itself. So much for the diseases that occur in the bone.

Infection on the surface of the synovial membrane, we believe, practically never takes place. Metastatic infection of hematogenous origin occurs in the synovial membrane or in the substance of the synovial membrane itself, and not on its surface, unless you disturb the endothelial cells in the surface layer. In other words, half of a syringe barrelful of virulent pneumococci injected into the joint of a dog, if you do not disturb the endothelial cells, does not affect the dog. On the other hand, if you inject the other half of the syringe barrel, and disturb the endothelial cells, it brings about a fatal phlegmon, showing the protection that is given by the endothelial cells of the synovial membrane. This accentuates the importance of protecting that surface.

The next important matters I will consider are the injuries in the neighborhood of joints and the manner in which they involve bone regeneration. It is in this class of cases that the practitioner receives the greatest discredit, sometimes deservedly, but mostly undeservedly.

A case in point is that of a fracture of the lower end of the humerus with backward luxation. There is regeneration of bone between the two fragments. If that (indicating) portion of bone were removed, there would be no regeneration of bone on that surface unless the periosteum be placed beyond and you endeavored to fill with bone the space between the bone and shaft. In all cases that appear

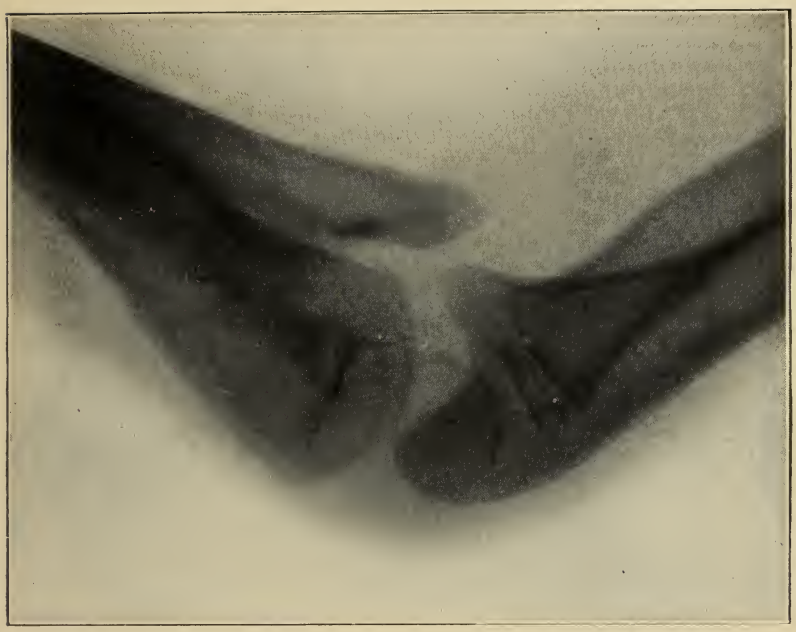

Fig. 1.—Fracture of lower end of humerus with displacement of fragments and deformity causing limitation of flexion.

Fig. 2.—Immediately after operation, showing ability to flex arm. Picture taken through cast.

Fig. 3.—Eight weeks after operation with full flexion. Extension was likewise perfect.

Fig. 4.—Second view, showing fracture through anatomical neck of humerus with dislocation upward of shaft of bone.

Fig. 5.—Fracture of the anatomical neck of the humerus with dislocation of the head of the bone into the subglenoid space.

Fig. 6.—Replacement of head of bone into glenoid cavity and fixation of head to shaft by means of a wire nail.

Fig. 7.—Four months later. Nail removed, sutures in situ; regeneration of bone complete, with return of function in joint.

Fig. 8.—Fracture of neck of femur with wide separation, due to interposition of capsule, and some upward displacement.

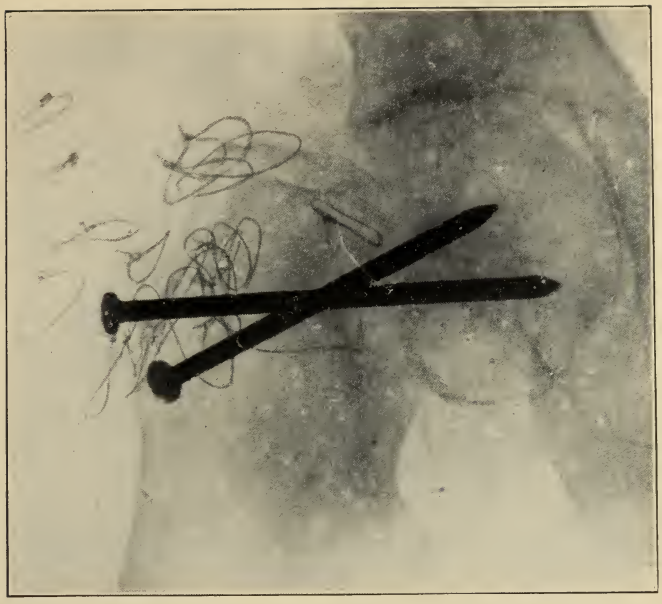

Fig. 9.—Six months after operation, showing nails still in position and bony union between head and shaft. Position normal; some limitation of motion yet. The phosphor-bronze wire used in suturing is still in situ.

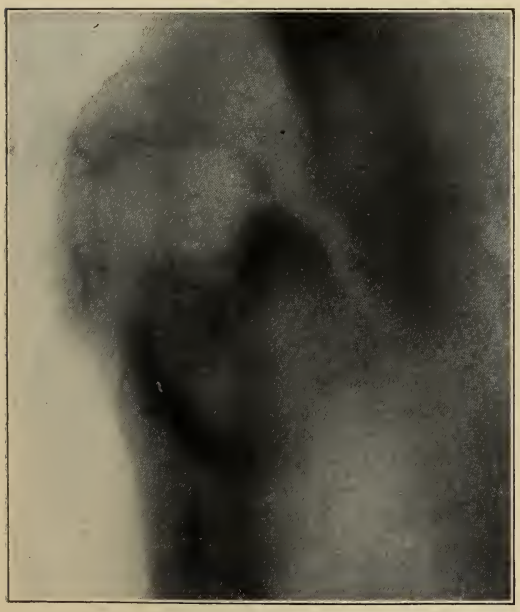

Fig. 11.—The large mass over the left hip is very evident.

Fig. 10.—Charcot hip with fracture of neck of femur and a large mass of bone near anterior superior spine of ilium, representing ossification of capsule.

Fig. 12.—Tuberculosis of the patella with pathological fracture. No involvement of joint. The patella with its bursa was removed.

Fig. 13.—Same case. Perfect symmetry of legs; no deformity; no loss of function.

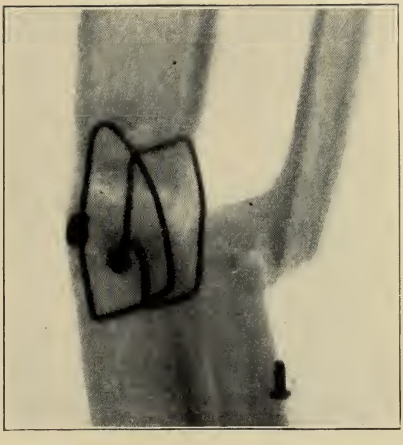

Fig. 14.—Fracture of tibia and fibula showing non-union after wiring.

Fig. 15.—Showing the intramedullary bone splint in tibia five months after operation.

Fig. 16.—Showing final result twenty-six months after operation. Complete bony union.

Fig. 17.—Showing non-union of humerus with perfect apposition of bone after use of Lane plate.

Fig. 18.—Showing bone transplant in position, four months after operation, with apparent bony union.

for operation you will not detect a fracture. Why? That bone cannot be approximated with this on account of the callus that has formed if you leave the layer as large as before. By removing the periosteum and that segment of bone you have new reproduction of bone and perfect restoration of function, as illustrated in this case. You must remove periosteum when you take out the displaced fragment, otherwise you will not have reproduction of bone as a result. (Figs. 1, 2, and 3.)

The next class of cases we will consider are those in connection with fractures of the shoulder-joint, with the reposition of fragments and the establishment of union. Fractures of the shoulder-joint rarely ever cut off the source of supply of the proximal portion, but it is important that the fragments be brought in apposition and maintained so if one expects to achieve good results.

A case illustrating how misleading the *x*-ray may be was one of fracture of the anatomic neck of the humerus. The bone from the side appeared to be in perfect alignment. There was no deformity. The second picture taken (Fig. 4) from in front showed that the bone is entirely displaced, and there is every condition there for an evil result. Bringing the ends in apposition and using a nail regeneration of the head is shown.

The next case (Figs. 5, 6, and 7) is an illustration involving an additional condition. It shows a fracture of the neck of the humerus in addition to a luxation. To the older surgeons it illustrates difficulties encountered in exposing these ends. At the former operation the head of the femur was removed because we could not restore the head and leave sufficient attachment for the nutriment of the head. The head can be removed, turned out, and replaced in the joint, and when nailed in position will rapidly regenerate exactly to the form it was formerly, and full motion will be restored. That brings up the question of regeneration of bone.

What are the regenerative forces of bone? They can be divided into (1) the regenerative effort of periosteum, which, when it is found a short distance from bone and grown in the same individual, has osteogenetic force. (2) The regeneration early of endosteum from the osteoblasts carried along with Haversian vessels and in the cells lying in the lacunæ between the lamellæ of the shafts of long bones. (3) The osteogenetic layer which produces bone —first, in the middle flat layer, and second, the deeper layer of the membrane which forms the branchial plates themselves, carrying with them the osteogenetic force. (4) The rôle played by the transplant which is implanted from one patient to another. The rôle which is played by the transplant is that it is in itself dead bone without periosteum. It has no osteogenetic force. It always dies. The rôle which it plays is one of supporting the Haversian vessels coming from living osteogenetic bone to which it is contacted, and that affords a support or scaffolding for the new Haversian vessels; the bone so formed from the Haversian vessels attains the same size and shape as the transplanted fragments, regardless of the size and shape it may have been. Those are the elemental things in connection with regeneration of bone, and they will be taken up as they apply to one case after another.

Let us consider next Pott's fracture. What are the elements of a Pott's fracture in connection with the joints? Complete restoration of the deformity, and the maintenance of the contacting interosseous ligament between the tibia and fibula. That is the all important element in a Pott's fracture. Unless the fragment is maintained in accurate position, the result will be an evil one. In treating a Pott's fracture posterior luxation of the astragalus is not infrequently overlooked, and then it gives a most painful result, as was illustrated in one of our cases. The astragalus is dislocated backward and the tibia is dislocated forward too far to permit of union in that way, and the patient came to

us for operation. We had a painful experience with this case. But there is another element that comes in. In another similar case there also existed an impacted fracture of the head of the tibia, a sinking in of the head of the tibia without the patient ever having had any pain at the time of the injury, as, for instance, pain in the knee. What does that mean? The very fact that he had no pain in the knee and had an impacted fracture of the head of the tibia shows that he had a tabetic impaction of his tibia, and that this was not a case for surgical attack.

In still another case illustrating the same type of luxation where we hoped we could reduce the fracture without hazarding the limb I removed this deposit and brought the tibia into position and reduced the luxation. After having reduced the luxation, I had elongation of an inch, and when I turned the foot forward I put tension on his posterior tibial artery, and as a result he had for three weeks deficiency of blood in his foot. He finally escaped with gangrene of the great toe and second toe, and we got a good result, but the circulation was collateral.

Another case came for examination and to see whether the doctor, who had previously treated the case, was responsible for the result. In looking at the picture one might think that the result was a bad one for a Pott's fracture, but it is a splendid result. A bad result in a Pott's fracture involves eversion of the foot, and this is not an eversion of the foot, but an inversion of it, and it shows some other lesion, not the result of the fracture, which produced that evil result, and for which the doctor was not responsible, and that was, this man had a typical Charcot joint in his ankle. He gave a positive response to the Wassermann test, and he had all the evidences of tabes except the ataxia of gait.

The next type of fractures we shall consider are those of the patella. Fractures of the patella must not be operated as a primary procedure. Up to a decade or

more ago, fractures of the patella were operated primarily, and the results were bad in a large percentage of the cases, although the disease involved no risk to life, nor of ankylosis. The reason for the bad results we obtained was because we operated when the synovial membrane of the joint was not fit for operation; it had been recently traumatized, was ready for infection, and had not developed resistance. Clinical experience has taught us that by waiting from seven to ten or fifteen days we can open the joint with practically no danger, because the blood and traumatic inflammation that have resulted to the synovial membrane have coffer-dammed the lymph spaces and rendered infection less liable to occur, and by postponing operation from ten to fifteen days you can get good and safe results in connection with it.

Another type of cases are those of injuries and fractures of the hip. What cases of fractures of the hip are surgical and what cases are not? Patients who have passed the age of fifty-five with arteriosclerosis, or with arterial changes, should not be operated. They should not be disturbed because they are bad surgical risks. I have come to another conclusion in connection with failure of union. It is not due to the fact that we have no apposition or contacting, or fairly good position, as there is good position of the bone before operation. Notice the position of the head and neck in Fig. 8, but there is no effort at reunion. Is it because the head or neck has no osteogenetic lines or elements? No. It is because the capsule was torn from the neck and remained attached to the margin of the acetabulum, and when the bone came back it impacted the capsule between the head and neck. (Figs. 8 and 9.) In this case the capsule of the joint was interposed between the head and neck. We had four cases in which the capsule was so interposed between the head and neck. The result after operation was perfect.

The next case was that of a man who had non-union and

limitation of motion from an enormous production of bone around the neck. The reason he had that production of bone is because nature endeavored to splint the capsule. Nature had united and thrown up all around the bone a splint that had been built up in its effort at reunion. This man came in with an enormous swelling of the hip. You will notice that the skiagram which accompanied the case is poor, in that it shows no deviation of the neck. This enormous enlargement occurred within six weeks. There was no pulsation which could be detected. After examining the man carefully I made a diagnosis of sarcoma of the hip, and dismissed him: Just as he was walking out of the office, I said to him, "Why do you limp? Does it pain you?" He replied, "No." "Did it pain you?" "No, it never has pained me." This man was thrown from his bicycle, sprained his ankle, got back on his bicycle, and worked right straight along for four weeks after the accident; but he limped because his leg was shorter. He had never had any pain in his hip. Then it dawned on me that he had a tabetic condition, and that this was a fracture of the hip, and that this enormous callus which caused this tumor which looked so much like a sarcoma was not a sarcoma at all but an excessive production of bone which occurs in Charcot's joint. It therefore was a Charcot's joint, occurring within six weeks. The Wassermann gave a triple plus, showing the maximum activity of the spirochetes at that time. We operated and found it was a typical Charcot condition. The head of the femur was broken off. It had entirely disappeared; it was absorbed. The enormous deposit of bone was in the second layer of tissue in the capsule, which accounts for the reproduction of bone. (Figs. 10 and 11.)

The next class of cases to be considered are the fractures and tuberculous disease of the patella. In two cases of tuberculosis we removed the patella and substituted the tendon patellæ for the patella. The tuberculosis was only a portion of the disease. There was a pathological fracture

from slight trauma. The tendon of the quadriceps was split, brought down, and attached, so that the patient has perfect function. (Figs. 12 and 13.)

We now come to a consideration of ununited fractures. In these fractures we must count on the help of the bone transplant as an osteogenetic force. If you will implant or invaginate between the ends a fragment of bone in a case of ununited fracture taken from some other position of the patient's body and hold it there, it is our experience that it will become ossified and produce a uniform result. (Figs. 14, 15, and 16.)

In one case a fracture in the upper third of the humerus was fixed with a Lane plate. There was splendid apposition, and still no osteogenetic effort whatever. There is not the slightest effort at reproduction of bone. If you implant a piece of bone three inches long, it forms a scaffolding for the Haversian vessels from above and below, and bone of the same size and shape is reproduced. (Figs. 17 and 18.)

We now come to the regeneration of bone in the neighborhood of tissues where the bone itself is dead, namely, where the head of the bone is dead, and the femur is the most common one in which that occurs; the humerus second. The moment you remove bone from its blood supply it always dies, and it acts in a regenerative way only as a scaffolding for the living osteogenetic elements with which it is contacted.

In a case of intracapsular fracture of the neck of the femur I supposed that I would find the head in the acetabulum, but probably merged in the tissues. When I went in there was a button of debris attached to the ligamentum teres and all the head and neck back of this position was gone. In order to get a new head I had to secure bone from somewhere. So I sawed off three-fifths of the anterior portion of the trochanter down onto the bone, detached it entirely, swung it around, and nailed

it around the neck. There will be perfect regeneration because it fulfils a law.

This law is illustrated in another case. It was a case of intracapsular fracture of the femur, with rotation of the head, and locking of the head in the capsule, so that the ligamentum teres was strangulated. (Fig. 19.) When I rotated the head and nailed it in the normal position, the question arose as to whether it was dead or not. The problem was that if this was sterile, and we believed it was, if it was put in apposition with osteogenetic elements, it would reproduce. The skiagram taken something like a year after the operation (Fig. 20) shows the head has undergone a little absorption on the side, but that there has been reunion. The boy has apparently no shortening, but on absolute measurement has one-half inch shortening. There has been elongation at the epiphyseal line and reproduction of bone. There is no limp. Result is perfect. No limitation of motion.

Let us consider the regeneration or restoration of bone after it has been destroyed by osteomyelitic infection. In transplanting bone you must always keep in mind one basic element, namely, that a piece of bone cannot be transplanted except in a sterile field. A little girl had destruction of the major part of the shaft of the tibia. The fibula was luxated outward and sliding up. We first implanted the head of the fibula below the epiphyseal line of the tibia, so as to maintain the length of the limb, and then endeavored to combat the osteomyelitis. We succeeded. Next we took a piece from the crest of the other tibia, five and a half inches long, implanted it and contacted it above and below where the dead bone had been removed; this was done eight months ago, and where there was no effort at regeneration of bone. The *x*-ray taken eleven months after operation shows reproduced bone sufficiently large and strong to support the weight imposed by the patient, which is a law of compensation in nature. (Figs. 21 to 23.)

The next element is the element of removal of bone for diseases other than those of the malignant type. In this connection I want to call attention to the splendid paper of Dr. Bloodgood on this subject, in which he speaks of types of lesions that are sometimes diagnosticated as sarcomata, but are not sarcomata. They are metastatic infections, and in such cases we formerly resorted to amputation, but now we find amputation is not necessary. These cases, however, are still diagnosticated by the microscopist as sarcoma. Some of them are due to injuries. We had a case where traumatism of the trochanter developed a tumor. The neoplasm extended into the head of the femur. The periosteum and muscular attachments were peeled off close to the bone. We filled in the space by a piece of bone taken from the patient's tibia, implanting the lower end into the upper end of the lower fragment, sewing the upper end into the capsule, and, as I have previously said, if it is sterile, it will only be a comparatively short time when that fragment will attain sufficient size to carry the patient's weight. Later photographs that were taken of this case show that two-thirds of the space is already covered. (Figs. 24, 25, and 26.)

In another case of the same type of tumor in the upper end of the tibia the tumor was encapsulated and close to the joint. The patient was a girl, aged about sixteen years. We made an excision, opening the knee, cut the upper end of the tibia off, except the articular surface. We implanted a piece of bone taken from the crest of the other tibia seven and a half inches long to fill up the space. The question was whether it is a sarcoma or a myeloma, but we have settled that point. We have obtained for this girl every advantage that she could have by amputation without amputating the limb, and that she will have as a result a good functionating limb. In this transplant we have carried the periosteum with it, showing the character of it and the encapsulation of it. Will that be reproduced? Yes. (Figs. 27 and 28.)

Fig. 19.—Fracture of neck of femur with separation of head, seven weeks after injury. Owing to separation of head from source of nourishment it was dead but aseptic, so that it could be used to bring about the formation of a new head. The globular mass in the centre of the picture is the head of the femur. The shaft extends behind and above it.

Fig. 20.—Head nailed to femur after reposition of fragments.

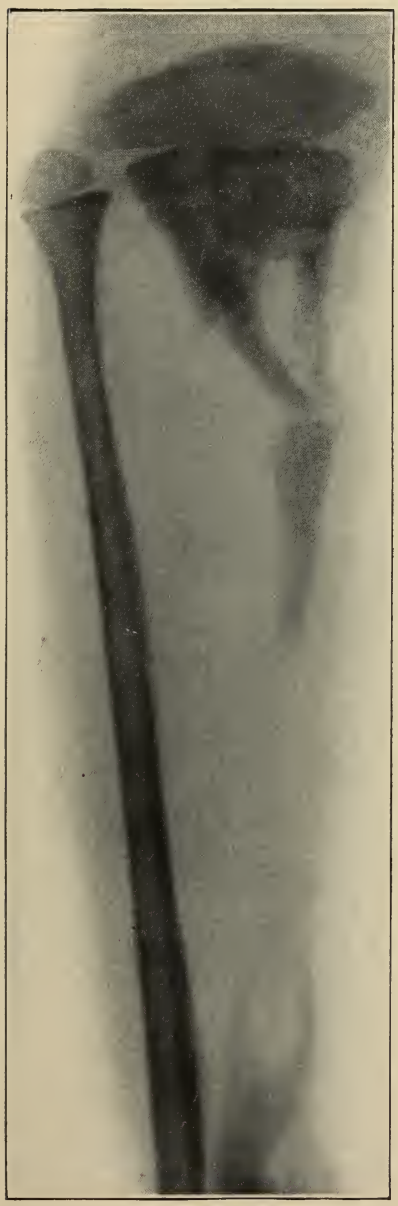

Fig. 21.—Destruction of the entire shaft of the tibia by osteomyelitis, the epiphyses and extremities remaining unaffected.

Fig. 22. — Three months after transplantation of a piece of the opposite tibia six inches in length. Beginning regeneration of bone.

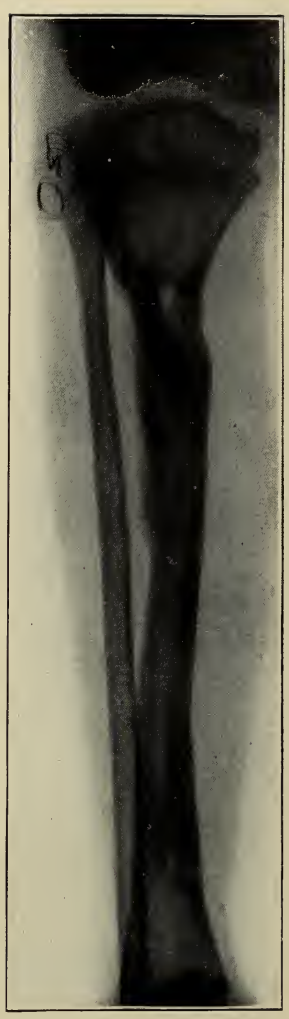

Fig. 23.—One year after operation, showing almost complete regeneration of the shaft of the tibia.

Fig. 24.—Chondrosarcoma of femur involving great trochanter and upper surface of the surgical neck.

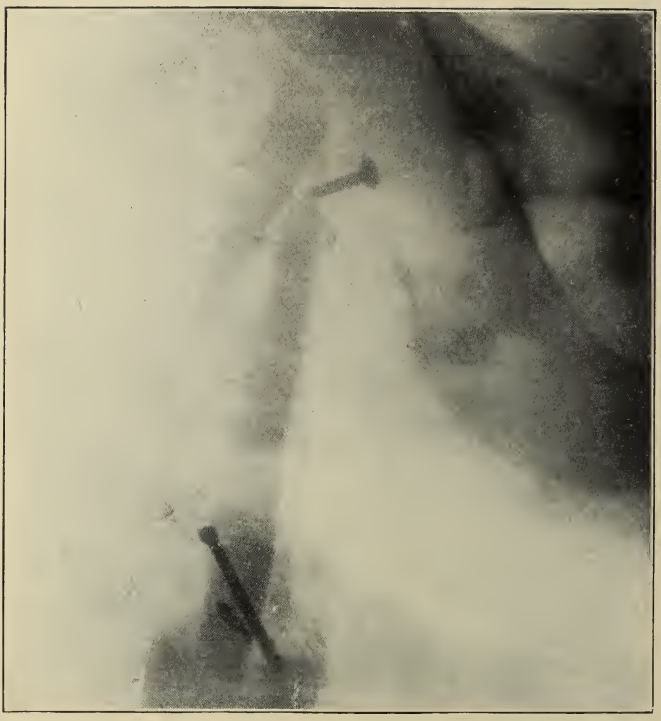

Fig. 25.—The entire extremity of the femur, including a portion of the shaft, was removed and a piece of tibia about 7 inches long implanted, the upper end being placed into the acetabulum and the joint capsule sutured around it. The fragment fractured at its upper end during its removal from the tibia. It was wired, nailed as shown, and implanted. This picture was made four months after the operation. On palpation there seems to be considerable regeneration of bone. The skiagram shows ossification for three-fourths of the entire length, but not so far advanced.

Fig. 26.—Condition of bone after removal and splitting. No apparent involvement of head by tumor process.

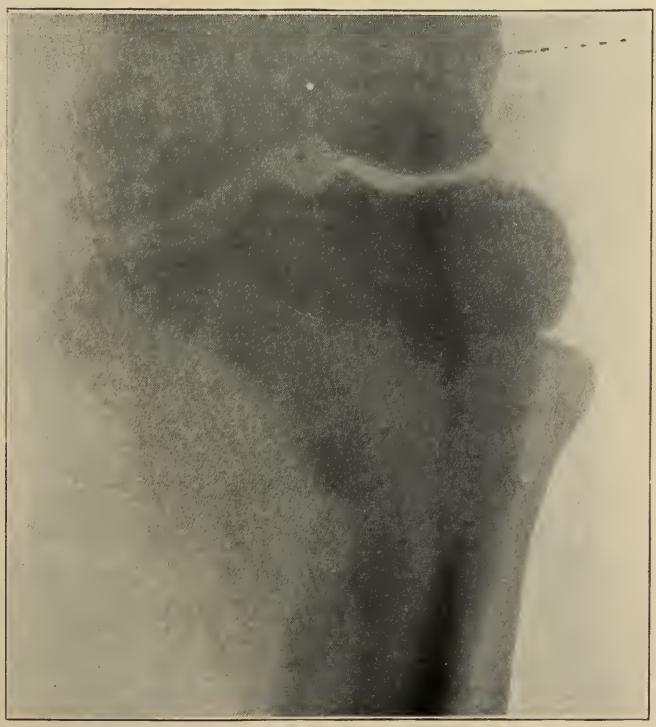

Fig. 27.—Sarcoma of upper extremity of tibia, not involving the joint, with destruction of inner aspect of tibia.

Fig. 28.—Five inches of tibia were removed, leaving the articular surface to which the upper end of the transplant was nailed as shown, the lower end being inserted into the medulla of the lower fragment and nailed in position. This picture was made two months after the operation and shows beginning regeneration of the tibial shaft.

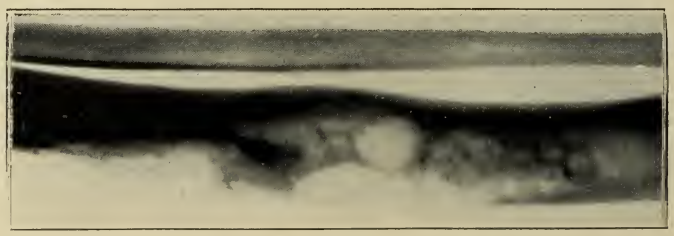

Fig. 29.—Boy, aged thirteen years, with osteitis fibrosa cystica of shaft of right tibia.

Fig. 30.—Seven months after operation, showing regeneration of bone, except at lower end of transplant, where a necrosis occurred, probably from the irritation of the nail. No return of neoplasm.

Fig. 31.—Cystic fibroma of upper third of humerus.

Fig. 32.—Metal jaw in position following resection of right inferior maxilla for neoplasm.

Fig. 33.—Showing freedom of motion of jaw with only slight flattening of cheek on right side. Picture taken three years after operation.

The next points for consideration are the tumors mentioned by Dr. Bloodgood, namely, osteitis fibrosa cysticus. That makes a nice combination, and it is all we want. We had a case which looked like a sarcoma. The pathologist said it was a sarcoma, and when clinically we said it was not he changed his mind. The operation was done by my assistant, Dr. Golden. He brought about restoration in this case by taking eight and a half inches from the tibia of the opposite side and transplanting it to fill up the space, and the picture shows effort at regeneration. The extent to which this can be done is beautifully illustrated on this patient. (Figs. 29 and 30.)

Remember, this skiagram is just as valuable as the microscope for making a diagnosis, and a little more so. The typical relation between the two neoplasms, as shown in that picture, is just as important as the microscopic picture. We believe that in this case it was the cystic type of growth that occurs in bone, and that amputation should not be done.

In a similar case involving the upper end of the humerus in a girl aged eight years we removed six and a half inches of bone, including the articular end, and implanted seven and a half inches from the tibia of the same patient. Here we have a new element to deal with. We have osteogenetic force from one side, and we sewed the other end into the capsule and put on Buck's extension to retain the length of the arm during the period of regeneration. The tissues are all regenerated inside the capsule of the joint, and also the tuberosity —all regenerated where the muscular attachments show. The functional and anatomical result is perfect. (Fig. 31.)

Another case we wish to mention is a case of heteroplasty, the reproduction of a functional condition without using bone from the same patient. Whenever you have an infected field you cannot transplant bone. This was a case of sarcoma of the jaw. We made a division of the mandible, took out two and a half inches of the right mandible, evulsed it

from its capsule and made a cantilever jaw of silver. We had the anatomical head rounded off; we implanted a metal plate into the mandible where it was divided, and then sutured the soft parts through and through, so that the silver jaw was quilted through with foreign material. She had suppuration and a sinus for something like six weeks thereafter, but the sinus closed and healing occurred. It is almost three years since this operation was done. I had a report from this patient on the first day of June, 1911. The photograph shows that there is no deformity of the face; that she can close her mouth without difficulty; that she has no sinus, and does not know, except for the absence of her teeth, that she has ever had an operation on the side of her face. (Figs. 32 and 33.)

DISCUSSION

Dr. Charles H. Mayo, of Rochester, Minnesota.—I rise to make a motion that Dr. Halsted, of Baltimore, be asked to open the discussion on Dr. Murphy's paper, and that Dr. Brophy, of Chicago, be also invited to take part in the discussion.

The motion was seconded and carried.

Dr. William S. Halsted, Baltimore.—I appreciate very much the compliment to be asked to open the discussion on this paper, but I am not so sure that I shall take advantage of it. I shall make my remarks very brief.

I have been greatly edified by Dr. Murphy's paper. It is a remarkable contribution, and I heartily indorse what he has said about the non-drainage of joints. We have, I believe, never been guilty of draining joints at the Johns Hopkins Hospital; at any rate, not to my knowledge. We did considerable experimental work on joints at the start, but I am not so sure it is not advisable to aspirate a joint rather than open it.

It was my hope that Dr. Murphy would say something about the transplantation of tissues between ankylosed surfaces, and I regret very much that he did not have time to do so, as his work in that direction has been most important.

Dr. Truman W. Brophy, of Chicago (by invitation).—I assure you, gentlemen, I consider this a compliment to be asked to say a few words on Dr. Murphy's paper. There are two features of the work of Dr. Murphy that have particularly appealed to me as one who is engaged in oral surgery, and one was the fact that we have come to recognize that we cannot rely always upon the findings of the microscope in relation to growths. A seemingly benign growth may become malignant, although microscopic examination may not show malignancy. I think this point has been established not only by what Dr. Murphy has presented, but also by what Dr. Bloodgood has done, and I think others have come to the same conclusion.

Another feature of Dr. Murphy's work which impressed me most favorably was that which referred to the removal of sarcoma of the jaw within the mouth. For a number of years I have been endeavoring to accomplish this work without external incisions. As a matter of fact, if you look over the text-books on surgery that have been prepared in the last ten years you will find but few of them that show a departure from the old custom that was established fifty years ago. You will see the same old cuts, the same old illustrations, showing external incisions on the face for the purpose of removing growths which might have been far better done within the mouth.

The work of Dr. Murphy we in Chicago all appreciate, as you do everywhere, and we are especially indebted to him for what he has done in the management of infections and diseases, and injuries of bones and joints. The work he has done in the treatment of ankylosis has appealed to the very best men in surgery throughout the country.

Like the gentleman who preceded me, I regret that Dr. Murphy did not have more time to point out some of his excellent work in the field of treatment of ankylosis of joints. What Dr. Murphy has given us is a valuable contribution to the literature of surgery, and I am sure it will be appreciated by everyone.

Dr. Joseph C. Bloodgood, of Baltimore.—I am sorry Dr. Murphy has left the hall. I would like to tell him that he could do this country more good the next year if he were to stop practising surgery and go about preaching a little more on the treatment of fractures. He has demonstrated very clearly that much of the work that was formerly done to restore the

functions of limbs after a fracture was unnecessary surgery; that the majority of fractures, if properly treated, in their recent state, will be followed by good results in the way of good function, and that a secondary operation is unnecessary. That is one of the most important things that should be taught the profession of this country, that the treatment of fractures in a recent state is not at all what it should be.

A second point he has demonstrated here is that the function of a limb can be restored after the removal of large pieces of bone, even involving a joint or joints, so that amputation is never necessary for a disease of the extremity unless the soft parts are so involved that their removal leaves the limb without function; that bone transplantation and joint transplantation are not at all difficult. I think these are two very important propositions to be rapidly disseminated throughout the profession of this country.

There is only one point I would like to make in which I do not quite agree with Dr. Murphy, and that is in the operation for bone cyst. It is unnecessary to remove the entire bone capsule. If the bone cyst is simply opened and the fluid let out, the cavity will fill up and the deformed condition of the bone will be restored. It has been shown by Dr. Sowers, of Washington City, that the peculiar capsule of connective tissue varies in thickness from one millimeter to the thickness of a finger in the great majority of cases. I have had two cases, one seven, and one four years ago, in which I question if any one of you could tell which humerus was involved, yet the expansion of bone at the time of the operation was greater than in the case of Dr. Murphy, and nothing was done but opening the bone cyst. According to more recent investigation, that will not be the result in every case. There will be a few recurrences, but if there is a recurrence I am inclined to think the convalescence will be more rapid if instead of removing the bone capsule we transplant a piece of bone within the capsule, which I have done with a perfect result. The function of the arm is better than that following resection, and bone transplantation will not be necessary in bone cyst. In bone cyst, bone transplantation will be necessary as a primary operation; it may be necessary in the few cases that recur which, in my experience at the present time, have been 2 out of 22 cases extending over a period of ten years.

THE MATAS OPERATION IN THE TREATMENT OF TRAUMATIC ANEURYSM.

By Walter C. G. Kirchner, M.D.
St. Louis, Missouri

Aneurysms, whether spontaneous or traumatic, are among the most important of the pathological conditions with which the physician or the surgeon has to deal. If left to itself and without treatment, the aneurysm enlarges and directly or indirectly results either in the sacrifice of an extremity or in the death of the individual. On account of the importance of the subject, additional information is always desirable, and I wish therefore to report briefly four cases in which a favorable result was obtained.

In general there are two types of aneurysms: (1) the true aneurysm, which is associated with arterial disease, and (2) the false variety, which is of traumatic origin. It is rare to have the aneurysmal sac formed by all the layers of the vessel with which it is associated, and usually the sac wall is composed of fibrous tissue or of connective tissue, lined with a thin membrane, which is continuous with the intima of the vessel from which it originated. In the traumatic arterial aneurysm, the vessel has usually been injured by bruising, gunshot, or by stabbing, and aneurysms of this type are not uncommon in modern warfare. The sac may contain dense white, or the softer red clot and liquid blood, or both varieties of clot may be encountered at the same time. In the fusiform sac there are two separate openings communicating with the main artery, while in the sacciform aneurysms, there is only one opening through which the blood flows in and out. Traumatic aneurysms are usually of the latter type.

The surgical treatment consists in methods of ligation or constriction of the affected bloodvessels, or in the radical procedures in which the sac is incised, aneurysmotomy (the operation of Antyllus), in which the sac is extirpated, aneurysmectomy (the operation of Philagrius or Purmann), or in which the sac is treated from within, endo-aneurysmorrhaphy (the so-called "Matas operation"). According to the type of aneurysm, (1) obliterative endo-aneurysmorrhaphy; (2) restorative endo-aneurysmorrhaphy; (3) the reconstructive endo-aneurysmorrhaphy may be employed.

In the Matas operation the sac is regarded as a serous space and is not removed. The control of hemorrhage and the methods of reconstruction are applied from within the sac, and the sac itself is obliterated by folding upon itself. Primary union of the wound may be obtained with the least possible disturbance to the main or collateral circulation. The entire subject of aneurysms with the methods of operation has been fully and most excellently treated by Dr. Rudolph Matas in Volume V of Keen's *Surgery*, and the reader is referred to this article for more concise information. In three of the following cases I have applied the principles of the Matas operation to traumatic aneurysms with good results:

Case I.—E. M., white, aged twenty-three years; a cook by occupation; when first admitted to the hospital, was suffering with gunshot of the right arm, the bullet entering near the inner condyle and ranging through the fleshy portion of the biceps. The radial pulse could not be felt, but circulation in the forearm was maintained. He was observed for a week, and the arm remaining in good condition, he was allowed to leave the hospital. Three weeks later, January 4, 1909, he was returned to the hospital with a swelling in the elbow which resembled an abscess. The arm was painful at times, sensation in the hand was lost, and he was unable to fully extend the forearm.

The mass, which was as large as an orange, was discolored

and was growing rapidly. It pulsated and had the usual signs of aneurysm.

Operation. Under general anesthesia an incision was made on the inner side of the biceps and down on the forearm. The biceps were isolated and separated from the tumor mass. Great care was taken not to injure the vessels, so that the anastomosing arteries would not be destroyed. The aneurysm had originated either from the inferior profunda, or, owing to its size, from a bifurcation of the brachial artery. A fusiform aneurysm about three-fourths of an inch in diameter had formed, and this sac having ruptured, a dissecting aneurysm resulted, forming a mass as large as an orange. The aneurysmal sac, which was composed of fibrous tissue, contained a recent blood clot.

It was impossible to approximate the ends of the injured portion of the vessel, nor was the wall of the aneurysm of sufficient resistance to permit of repair of the aneurysm by methods of reconstruction. It was necessary, therefore, either to suture or ligate the vessel or to fill in the gap by transplantation. The latter course was decided upon, and for this purpose a section of basilic vein was taken. The sac having been removed, the section of vein was slipped over the severed ends of the artery, and the vein was secured to the artery by means of mattress sutures. The free margins of the vein were then sutured to the outer portion of the artery. The procedure was similar to Murphy's invagination method of arteriorrhaphy. When the Esmarch was removed, the vein became distended, but it was difficult to make out pulsation in the distal portion of the artery.

The anastomosis having been made, the muscular structures were approximated with catgut and the skin with silkworm gut sutures. A small rubber tube was used to provide drainage of the accumulation of blood in the wound. The wound healed by first intention and, although the pulse was not obtainable at the wrist, the patient was able to extend the forearm and had good use of the extremity.

Case II.—S. S., white, aged thirty-two years, was admitted to the hospital July 7, 1909, with the history that five weeks before, while working in a cordage factory, he sustained an injury to the lower portion of the left brachial artery. The wall of the artery was severed, causing arterial bleeding from the wound. Upon examination a tumor about the size of an egg, and having all the characteristics of a brachial aneurysm, was found in the lower portion of the arm.

Operation. Under ether anesthesia, an Esmarch having been applied, an incision was made over the tumor and efforts were made to isolate the vessels. The veins and nerves were found to be densely adherent to the sac, which was fairly well isolated. The sac was opened and was found to contain mostly dark-colored clot. At the base of the sac a slit-like opening was found, which was closed over Lembert fashion with a row of interrupted silk sutures, and was re-inforced by a second row of sutures. According to the Matas method, the walls of the sac were folded in and the sac was thus obliterated. The wound was closed without drainage.

After the operation the pulse could easily be detected. The patient's convalescence was uneventful except that in the beginning there was considerable pain in the arm. The wound healed by first intention and he obtained good functional use of the arm.

Case III.—G. W., white, male, aged sixty-five years; laborer; entered the hospital March 17, 1909, stating that three and one-half years ago he had sustained a severe wrench of the right arm while holding a crowbar upon which a hammer descended obliquely. He had also noticed a small opening on the inner surface of the right arm at the junction of the lower with the middle third, which allowed the escape of blood. The region became greatly swollen, and a physician applied a tight bandage to the arm to control the hemorrhage. Gradually the swelling became

less, until it was as large as an English walnut. It remained this size and "throbbed," and, not giving him any difficulty, he returned to his work. Four months before coming to the hospital he began to experience pain in the right hand, and later the swelling increased, causing pain and numbness in the hand, and inability to extend the forearm.

Examination. Patient was well developed, but showed evidence of age and exposure. The cardiac area was normal and there were no organic lesions. All the palpable vessels showed sclerotic changes. There was a pulsating swelling in the lower third of the right arm, most prominent on the inner side. The measurement around the arm over the tumor was thirteen and one-half inches, while a corresponding point on the left arm measured only nine and one-half inches. The tumor was expansile in all directions. On auscultation bruit was heard and a distinct thrill could be felt. The tumor was fusiform and as large as a grapefruit. The radial pulses were not synchronous, although the right radial was nearly as strong as the left. The right hand showed passive congestion with clubbing of the finger tips. A radiograph was made which showed the tumor, no bone erosion, and a piece of metal about the size of a pea at the apex of the tumor.

Operation. Under general anesthesia the Matas operation for aneurysm was undertaken. An incision was made over the site of the tumor through the skin and directly into the sac, which was opened up along its entire course. Hemorrhage was controlled by pressure on the brachial artery. Upon examination it was found that there were two communicating cavities, one on the right of the artery about the size of a hen's egg, and one to the left about the size of an orange. The aneurysm had dissected its way along the humerus, so that it was freely exposed for a distance of three inches. The sac contained thick blood and a moderate amount of fibrinous deposit. The opening in the artery was found to be a slit about a quarter of an

inch long. This was closed over by a row of silk sutures, and reinforced by a second row of sutures. The sac was obliterated by dissecting away a portion from the skin and folding the sac in upon itself. Dependent drainage with rubber tube was established on the inner side of the arm. Deep sutures were used to obliterate dead spaces. The patient stood the operation well and was returned to bed in a good condition.

Immediately after the operation the radial pulse was reëstablished. His convalescence was uneventful and the wound healed by primary union. Satisfactory pulse tracings were obtained and the patient's arm was restored to usefulness. The obliterated sac remained hard and firm and there was no indication of the return of the aneurysm.

Case IV.—D. M., white, male, aged thirty-seven years; nativity, Hungary; a leather worker by occupation; was admitted to the hospital April 6, 1909, for aneurysm of left thigh.

The patient had been accustomed to hard work and occasionally used alcohol to excess. His family history had no bearing on the case, and his previous health had always been good. Upon close questioning after the operation he recalled that about two years previously he had received a blow on the left hip by some thugs, but he suffered no inconvenience and had never given the matter any special attention. He also stated that at the age of ten he was struck in the region of the tumor with a pitchfork.

Examination. The patient was well developed and on account of pain and tumor in the left groin was compelled to hold the left thigh in a flexed position. The cardiac dulness was slightly increased, apex beat palpable in the fifth interspace and internal to mammary line. Heart sounds were clear, there being no murmurs or accentuation. Pulse was of fair volume and tension. Pulse 96, respirations 34, temperature normal. Abdominal wall was relaxed and there was no abdominal tenderness or rigidity.

Case IV.—Postoperative result in large traumatic aneurysm of the femoral artery at Scarpa's triangle containing broken knife-blade.

On the inner and anterior aspect of the thigh, near Poupart's ligament, there was a tumor-like mass about eight inches long and five inches wide. The tumor expanded with every heart beat and in all directions and on auscultation a bruit was heard over it with every systole. The pulse at the foot was scarcely perceptible. A radiograph of the tumor region was made which showed the presence of a foreign body, most probably some metallic object in or near the aneurysm.

Operation. Incision was made over the femoral vessels in the region of Scarpa's triangle. The femoral glands were removed and efforts were made to ligate the femoral artery at the femoral ring, but this procedure, owing to size and location of tumor, was not possible. The incision was now extended above Poupart's ligament and a retroperitoneal dissection was made, exposing the external iliac vessels. Lying over the vessels and just internal to Poupart's ligament a gland three inches long and one inch wide was found, which was removed. The artery was isolated and the blood current was temporarily controlled by means of a clamp. The incision was then prolonged over the entire tumor mass, which was as large as a child's head. The aneurysmal sac was freely opened and dark clots of blood and fluid blood were removed. The sac also contained a broken and rusty knife-blade two inches long, which, no doubt, had produced injury to the artery.

Examination showed a slit in the bottom of the sac at the site of the vessel. The slit was about half an inch in length and one-eighth of an inch in breadth. It was difficult to control the bleeding in the sac, owing to the collateral circulation. The opening in the artery was closed, Lembert fashion, with fine silk sutures. The line of sutures was then reënforced, and this was found advisable on account of the friability of the sac. When the clamp which controlled the blood supply was removed, it required but a single suture to effectively control the hemorrhage.

The pulsation above the repair of the vessel was distinct; below it, however, the pulsation was very feeble. The walls of the sac were dissected free from the overlying tissue. They were sutured in such a way that the sac was turned in upon itself, silkworm-gut mattress sutures being used and the pressure controlled by tying over a roll of gauze. Other through and through silkworm-gut sutures were used to obliterate dead spaces, and in the dependent portion of the sac through a supplementary opening a rubber tube was placed to drain away accumulation of blood. The skin wound was closed with interrupted sutures. After the operation pulsation could not be felt in any of the arteries of the foot. The extremity, however, was warm and there was evidence of retarded circulation. The operation, on account of the dissection required and the hemorrhage in the sac, was considerably prolonged. The patient, however, stood the operation well, and was put to bed in a fairly good condition.

Five hours after the operation the temperature was 101°, and on the following day it rose to 102°, and then gradually returned to normal. For some days he had severe pain in the thigh, but this gradually subsided. No doubt some of the pain was caused by the tension sutures, which after a few days were gradually loosened. The extremity was kept warm by wrapping it in cotton. A slight wound infection took place, which, however, did not interfere materially with his convalescence, and the prospects for a useful limb were good. The patient left the hospital in the fourth week after the operation and was able to attend to his usual occupation.

In the first case reported the aneurysm resulted from a gunshot wound of the artery, the original sac being of the fusiform type. Inasmuch as the sac wall was thin and friable, obliterative endo-aneurysmorrhaphy was indicated. Instead, however, desiring to preserve the continuity of the blood stream through the artery, and the ends of the vessels

being too widely separated after extirpation of the sac, a complete biterminal vein transplantation was performed. The operative result was satisfactory and encouraged me in the use of this procedure when indicated in deficiencies of larger and more important arteries.

In the second and third cases the aneurysm was sacciform and resulted from stab wounds of the artery. In these instances the opening in the vessel is found to be slit-like, ovoid, or to resemble a groove. This type of aneurysm is well adapted to the Matas operation, and excellent results are obtained.

In the fourth case the aneurysm was interesting on account of its size, its location, and from the fact that it contained a foreign body. The preliminary clamping of the external iliac by the retroperitoneal route was found easy in this instance and was a great aid in the operation, although hemorrhage through the collateral circulation was quite active and lengthened the time of operation. In other instances, where multiple aneurysms of the femoral had caused gangrene of the extremity, I have found the peritoneal ligation of the external iliac of great service preparatory to disarticulation of the hip-joint. The Matas operation is especially applicable to these large aneurysms, because by its simplicity it limits the amount of trauma and therefore decreases the danger of infection.

Matas, in his article in Keen's *Surgery*, reports on 110 cases of aneurysm treated by the intrasaccular method. The mortality was 2.3 per cent. He has recently collected 180 cases that were operated on by his method. Relapses occurred only in the restorative operations (28.9 per cent. of the group), and this fact emphasizes the great care that is required in operations of this type. When the operation is performed at a suitable period and under favorable conditions I believe the reconstructive operation as devised by Matas is of the greatest value, especially in sacciform aneurysms of traumatic origin.

THE WIRING OF OTHERWISE INOPERABLE ANEURYSMS, WITH REPORT OF CASES

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The operation of wiring otherwise inoperable aneurysms, devised in 1864 by Moore, of London, and subsequently modified by Corradi, is one which deserves more general attention and wider use than up to the present time it has been accorded by the medical profession. In fact, outside of this country it has attracted little attention. Here, owing to the excellent work of Stewart, Hunner, and others, it has been employed in a number of clinics with a measure of success that, considering the otherwise hopeless nature of the affection, has been fairly gratifying. The technique of the operation, worked out by the authors above mentioned, has been little modified by later observers. The modifications that have been suggested have been of minor importance. Some question as to the correctness of the conclusions of Stewart and Hunner has been raised by Freeman and others, but experience with a considerable number of patients, 25 in all, in which this operation has been employed, convinces me as to the soundness in the main of their deductions. Those interested in this subject should consult the monographs of Ransohoff, who in 1886 reported the first wiring operation done in this country, Abbe Stewart, Hunner, Matas, Freeman, Hare, and the most recent communication upon this subject, that of Eshner, in which he has collected and tabulated 38 reported cases

up to May, 1910. To this number my associate, Dr. B. M. Bernheim, without claiming an exhaustive review of the literature, has added 21 cases, including 18 of my own hitherto unreported. For the benefit of those who may not be familiar with this procedure it will not be out of place, perhaps, to call attention to a few of the more important points to be borne in mind; in the first place, in the choice of this operation, and in the second place, in its practical application. It goes without saying that cases in which this method is to be used should be selected with great care. It is equally obvious for anatomical and other reasons that methods of treatment applicable to aneurysm in other parts of the body do not apply here. The brilliant and epoch-making work of the President of this Society (Matas) in the plastic surgery of the vascular system, the metallic bands of Halsted, and the suture methods of Carrel are in the present state of development of intra-thoracic surgery clearly out of place in this region, although much is to be hoped for in the future. The same is true of the older methods, with the possible exception of the needling operation of MacEwen, which has never been in general use. Palliation to a slight degree only can be reasonably expected from medical measures. Authentic cases of spontaneous cure are so rare as to warrant no reasonable hope of relief from this source. Wiring, then, is the only effective means at our disposal with which to combat this otherwise hopeless condition, for the tendency in aneurysm of the aorta in the vast majority of cases is steadily progressive toward a fatal termination. Reason suggests and experience has shown that the only class of cases in which this method offers any reasonable expectation of cure is in aneurysm of the sacculated variety, especially when of traumatic origin. It is not applicable to and should not be employed in the fusiform variety. The reason for this is obvious.

The morbid condition of the vessel wall which gives

rise to the weakening and subsequent dilatation of the arterial coats is, as a rule, not a localized process and the usually accompanying increase in blood pressure is opposed to the establishment of conditions favorable to a cure. An accurate diagnosis is essential in the selection of the individual case in which this method is to be applied. To this end the *x*-ray, especially the use of the fluoroscope, is indispensable, as the pulsation of the aneurysm is readily distinguishable by the aid of this instrument.

The immediate risks of the operation, especially in aneurysm of the thoracic aorta, are not great. They consist in the possibility of an end or loop of the wire sliding along the wall of the aorta in the direction of the heart and interfering with the action of its valves (its presence in the aorta gives rise to no symptoms) or in the formation of emboli which have been swept off by the blood current. That a loop of wire may even enter the cavity of the heart without fatal result is illustrated by Parham's case, in which such a condition was found present at autopsy. That there is real risk from emboli is well illustrated by a case reported to me by a physician who himself had been the subject of a thoracic aneurysm which had incapacitated him from performing his professional duties. I had wired his aneurysm, with the result that he had resumed his practice in a distant city and had himself subsequently wired a thoracic aneurysm for a patient. In a letter to me, he writes that immediately after wiring the aneurysm the patient complained of pain and numbness in his arm, which at once became blue and went on to the formation of gangrene of the hand and forearm. He was compelled subsequently to amputate the arm above the elbow. The aneurysm at the time his letter was written was apparently cured and the patient well satisfied, saying that he had rather have one arm and no aneurysm than two arms with an aneurysm.

The remote risks arise from emboli or sloughing due to a too strong electric current, sepsis, and from giving away

of the aneurysmal wall, owing to the possibility of the new-formed clot shunting the blood current against another portion of the aneurysmal sac. This last possibility has been denied by Freeman, but after wiring I have seen, upon more than one occasion, a sudden bulging of the aneurysmal sac in some one direction which could not be accounted for in any other way than by a giving way of the aneurysmal wall at that particular point.

While these risks are not great, indeed, surprisingly small, considering the nature of the affection and the structures with which one is dealing, yet it is only fair that their existence should be explained to the patient or his friends.

The immediate results attending this operation are sometimes most striking. Perhaps the most remarkable of all is the diminution in pain which takes place frequently before the operation has been completed. In a number of instances the patient while yet upon the operating table has stated that the pain has appreciably decreased. This fact has been so frequently noted that I have felt justified in stating to the patient that even if he derives no other benefit from the operation he can confidently expect a marked relief from his pain. What is true of pain is also frequently true with regard to dyspnea, which sometimes is very pronounced in advanced cases. The explanation of these phenomena is not altogether clear. One would rather expect that the disturbance caused by the operation itself and the presence of the needle and wire in the interior of the aneurysmal sac might produce certain circulatory disturbances which would tend to increase rather than diminish the pain. It is possible that the electric current may exercise an anesthetic effect. If the relief was due entirely to this fact, however, one would expect the pain to return after the withdrawal of the electric current, but such is not the case. As a rule, the hardening of the clot as shown by the lessening or disappearance of expansile pulsation does not take place for some days or even weeks, but immediate

marked diminution in the pulsation of the tumor has been observed in a number of cases. This is not so surprising as the other phenomena to which we have just referred.

As to the technique of the operation, all that is necessary is a hollow needle, of not too large size, insulated with the best quality of French lacquer to within a short distance of its point. Through this a wire of suitable size is passed. Various metals have been recommended for this purpose. Hunner in his experiments found that a wire made from a silver and copper alloy in the proportion of seventy-five parts copper to one thousand silver answered the purpose very well. We have used this in all our cases. The wire is wound tightly upon a wooden spool in order to give it a coil. Care should be taken to avoid kinking, as this interferes with its passage through the needle. After the skin has been cocainized and drawn to one side, the needle is inserted slowly until the arterial blood appears in jets through it. The end of the wire which has previously been passed into the lumen of the needle, but not as far as the point, is now passed into the aneurysm until the amount wound upon the spool has been inserted into the aneurysmal cavity. We have arbitrarily used ten feet. The objection that has been urged against a greater amount is that it prevents the contraction of the resulting clot in the course of its subsequent organization. Freeman and some others believe that the greater the amount of wire introduced into the sac the better. My observations have not borne this out. If the needle is not insulated, or if it is pushed so far into the aneurysmal sac that its shoulder comes in contact with the skin, or if the needle is not well insulated, there is danger that an electrolytic burn may result along the needle's track. The resulting slough decreases the strength of the aneurysmal wall and is liable to cause leaking at this point. Hare calls particular attention to this, and I have observed it in two of my own cases, of which the specimen is one. Care should be taken that the strength of the electric current should

not be too great, that is, it should not exceed 75 milliampères. Charring of the sac was observed in Halsted's case. Here the current was supposedly not greater than 75 milliampères. Subsequent hemorrhage resulted from necrosis of the sac at the point of charring. The current should be continued for at least one hour. In my later cases I have continued it occasionally for nearly two hours. The positive pole should be attached to the wire, the negative at the patient's back. Disorganization rather than formation of clot occurs at the negative pole. After the current has been passed through the aneurysm for the given time, the needle should be carefully withdrawn, making use of a slight rotary motion in order best to accomplish this. The wire should be cut as short as possible, depressing the skin by the point of the blunt scissors. The skin should be then pinched up with the fingers until the end of the wire is completely buried beneath the entire thickness of the skin. If the skin has been drawn to one side before the insertion of the needle, as suggested, the end of the wire will not remain opposite the skin puncture. This seems a small point but it is necessary in order to prevent a certain amount of irritation and the possibility of infection extending down along the course of the wire. Pressure should be applied immediately upon the withdrawal of the needle in order to prevent the formation of a hematoma due to the escape of blood into the subcutaneous tissues through the needle hole. In one of my cases an hematoma formed which gave rise to a sloughing of the overlying skin and subsequent infection of the clot, and undoubtedly hastened the patient's death from hemorrhage.

The ultimate results of this operation are necessarily somewhat disappointing when one considers the small percentage of cures. Some observers insist that no cases are permanently cured. This, however, it seems to me, is too extreme a statement. A small percentage of cases have died as the immediate result of the operation. A

larger percentage have died from remote results of the operation. A majority have been improved by it. Improvement has lasted from a few days to a term of years. A few cases, I believe, can truthfully be said to have been completely cured. A good deal, of course, depends upon what constitutes a cure.

One of my own cases, an elderly physician from the South, who suffered from an aneurysm of the aorta just above the bifurcation is a case in point. His aneurysm had previously been treated by Dr. Halsted by the application of one of his bands. Unfortunately, owing to some unexplained cause, a slight infection had taken place about the band. His symptoms continuing, at Dr. Halsted's suggestion I wired the aneurysm through an abdominal incision. As a result, the patient's symptoms completely disappeared, as far as his aneurysm was concerned, but owing to the infection about the band, and to his advanced age and weakened condition, he ultimately succumbed.

Autopsy showed a complete obliteration of the aneurysmal sac and the cause of death to be due to infection. Comment is unnecessary.

In several of the cases, gelatin injections were administered in addition to the wiring, with apparently good effect. In a case reported in a private communication by Jones, this was done. The patient after six years is still living and in good physical condition but has recently noticed a recurrence of pain in the chest.

It is of the utmost importance, and I want to emphasize this fact, that these cases should be kept as nearly as possible in a state of physiological rest for a term of months after the wiring. In this way only will the best results be secured. In three of my cases, after the complete subsidence of all symptoms referable to the aneurysm, the patients, because of this fact and in spite of orders to the contrary, dated the return of their trouble immediately following some unusual effort. Hirschfelder suggests that the adminis-

tration of the calcium salts, after the method of Wright, both before and after this operation might be of advantage. So far as I know this has never been done. It is worth a trial.

Of our 25 cases, so far as I know, but we have not been able to trace them all, only three are still living. One after nearly three years, the other two not yet a year. All were aneurysms of the thoracic aorta. All my cases were males, mostly young men, only two being over fifty years of age. One-half of them gave a history of lues and one who denied it had a positive Wassermann reaction. Over 25 per cent. admitted using alcohol to excess. In three instances the trouble was of traumatic origin. In one case the recurrence dated from a fall from a height, the patient catching himself with the hand of the affected side. This case was of special interest because I resected the greater part of the first and second portions of the sternum and the first, second, and third ribs on one side in order to expose and examine the aneurysmal sac, so close was it to the heart, before daring to insert the wire.

It is an interesting fact that at first practically all of our cases were aneurysms of the abdominal aorta. In recent years the reverse has been true, and they are now almost all of the thoracic variety. The latter are more amenable to treatment by this method owing to their greater accessibility and because a general anesthetic is not necessary.

On the whole, the results of this operation, when one considers the absolutely hopeless condition of the patient under any other method of treatment, would seem to justify its employment in every case where it is not contra-indicated.

Case I.—No. 7140. W. T. G., male, aged twenty-seven years. Printer. Diagnosis abdominal aneurysm. Patient entered the hospital complaining of swelling, pulsation, and pain in the abdomen. He gave a suspicious syphilitic

history. He had had pain and soreness in his stomach and intestines for four or five years, but the symptoms had gotten much worse during the six months previous to admission. Pain was so severe that he was unable to lie on his back or right side, and when he walked, he had to walk with a decided stoop. Upon examination a pulsating mass was found in the epigastrium about the size of a fist. A distinct thrill could be felt and heard over this mass. At operation, by Dr. Halsted, 7 inches of No. 5 silver wire were inserted into the aneurysm when it kinked. The current was run through this twelve minutes, after which the wire was cut off. At another point 38 inches of No. 4 wire were inserted and the galvanic current run through this wire for one hour and twenty-five minutes, varying from 30 to 100 milliampères. No change in the pulsation of the tumor was noted. The patient died twenty-four hours after operation from rupture of the aneurysm through the diaphragm, probably due to a burn from too strong electric current.

Case II.—No. 8050. R. E. E., male, aged twenty-five years. Bookkeeper. Diagnosis: aneurysm of the superior mesenteric artery. Patient entered the hospital complaining of pain in the abdomen. He had a suspicious syphilitic history. For about one year previous to admission he had been suffering increasing pain of a sharp and steady character in his abdomen, so much so that he was unable to work. On examination there was found a pulsating globular mass in the epigastrium, a little to the left of the middle line; the pulsation was of an expansile character, and there was a distinct thrill. At operation, August 27, 1908, the pancreas was found covering the sac and had to be dissected off of it, after which 5 feet of drawn silver and copper alloy wire were inserted without difficulty. The galvanic current was run through this wire for one hour and twenty minutes, strength varying from 30 to 70 milliampères. The pulsation in the tumor seemed less after the

wiring and there was no thrill to be felt. Following the operation, however, the patient continued to suffer great pain and finally died twenty days later from rupture of the sac into the duodenum.

Case III.—No. 9935. H. P., male, aged thirty years. Machine agent. Diagnosis, abdominal aneurysm. The patient entered the hospital complaining of an aneurysm. He denied syphilitic infection. For about one year previous to his admission he had been suffering intense pain in his abdomen radiating to his back. This pain gradually became so bad that he was unable to walk 50 yards, and he had to take a great deal of morphine to get relief. Upon examination there was a definite bulging in the epigastrium, where a distinct tumor having an expansile pulsation could be felt. A systolic and diastolic bruit could be heard over it. On January 26, 1900, 9 feet of silver and copper alloy wire were introduced into the aneurysmal sac and 10 milliampères of current sent into it for one hour.

The patient was discharged about two months later, having obtained great relief from his pain. Otherwise, however, there was no benefit. The tumor and pulsation could still be felt.

Case IV.—No. 10379. H. C. P., male, aged thirty-six years. Lawyer. Diagnosis: abdominal aneurysm. Patient entered the hospital complaining of pain in the stomach, inability to sleep, and loss of appetite. He denied a luetic history. He was a rather heavy drinker. For about a year, patient had been suffering from pain in the abdomen, especially on lying down. This pain gradually became so terrific that the patient was unable to sleep or eat. He was accustomed to take great quantities of laudanum. The pulsation was of an expansile character and a systolic murmur could be heard over the tumor. At operation, 11 feet of wire were introduced into the aneurysmal sac and 10 milliampères of current were run through for one hour. The patient reacted well to operation, but four days

later he began to have great pain and difficulty in swallowing, and his pulse rose to 130. He continued in this condition for four days, when he suddenly died. No autopsy.

Case V.—No. 11080. R. W. F., male, aged fifty-three years. Machinist. Married. Diagnosis, aneurysm of the abdominal aorta. The patient entered the hospital complaining of a full feeling in the abdomen. He had a suspicious syphilitic history. Had lost 70 pounds in three years. For six months he had suffered from palpitation, shortness of breath, and pulsation in the abdomen. He had had no pain, his appetite was good, no cough or no epigastric symptoms. Upon examination a prominent pulsating mass was found in the epigastric region a little to the left of the median line. Pulsation was of an expansile character. No definite thrill was felt but a systolic and diastolic thrill was clearly heard. At operation, 11 feet of silver copper alloy wire were introduced, and 10 milliampères of current were run through the wire for one hour. The patient was not improved by the operation. He was discharged later at his own request.

Case VI.—No. 11189. J. D., male, aged thirty-four years. Carpenter. Diagnosis: abdominal aneurysm. Patient entered the hospital complaining of an abdominal aneurysm. He had had syphilitic infection. For two years, the patient had suffered from pain in his back, and for three months pain in his abdomen. Of late, the pain had been so bad that he was unable to work and was compelled to take morphine for relief. He had himself noticed pulsation in the abdomen. Upon examination a wide area of pulsation was felt in the epigastrium a little to the left of the median line, and a systolic bruit heard. No definite tumor, however, could be made out. Ten feet of alloy wire were inserted and 10 milliampères of current were run in for one hour and fifteen minutes. Fifteen days later the patient suddenly began to have extreme pain in his back, accompanied by nausea and vomiting and died.

Case VII.—No. 14053. A. B., male, aged forty-three years. Married. Pilot. Diagnosis, abdominal aneurysm. The patient entered the hospital complaining of pain in his abdomen. He had always been a heavy drinker. He denied syphilis. For five years he had a sharp stinging pain about the umbilicus. Five weeks before admission, this had become so bad that he had to stop work. Upon examination there was a pulsation which could be seen and felt all over the abdomen, but in the epigastrium a definite mass having an expansile pulsation could be felt. There was a systolic shock and thrill. At operation, November 14, 1902, 11 feet of wire were inserted and 10 milliampères of current run through this wire for one hour. Patient complained of violent pains throughout the entire operation. Following operation, there was no improvement in the condition except, possibly, that the tumor could not be as readily grasped and the pulsation seemed less than before operation. He was discharged at his own request one month after operation, somewhat improved.

Case VIII.—No. 21248. A. T. Van H., male, aged forty-six years. Married. Mechanical engineer. Diagnosis thoracic aneurysm. The patient entered the hospital complaining of pain in his chest. He had had syphilis. He had been a moderate drinker but a very hard worker. For two years he had had sharp pain near the centre of his chest. He had also had an intermittent cough but no expectoration. The pain extended to his back and down the arms and was so severe that he was unable to lie down on his left side. No shortness of breath and no difficulty in swallowing. Upon examination there was a distinct precordial bulging or heaving and a very definite pulsation, being especially marked at the fifth right interspace near the sternum, where a diastolic shock could be felt. There was no thrill. The patient had a definite tracheal tug. At operation, September 13, 1907, three-fourths of the sternum and the end of the right clavicle were resected together with the

costal cartilages of the first four ribs on the right side. Eleven feet of wire were inserted into the aneurysmal sac and 10 milliampères of current run into it for fifty minutes. Three weeks after the operation the patient was discharged practically well. The area of the heaving and pulsation was considerably diminished, and the patient had practically no pain.

On June 29, 1908, patient was readmitted. He had been at work ever since two weeks after his previous discharge. He was all right until April 1, 1908, when he slipped while on a scaffolding and to prevent himself from falling he grasped hold of a piece of timber with his left hand, injuring his chest severely. Soon after this he noticed a swelling over his chest. No disphagia, no dyspnea, and very little pain. Upon examination, to the right of the median line at the second interspace, there was a small conical swelling which had an expansile pulsation, and over which a diastolic shock could be felt. Twelve feet of wire were inserted into the aneurysmal sac and a current varying from 10 to 40 milliampères was run through the wire for one hour.

One month later he was discharged in excellent condition, the tumor was smaller, no dyspnea and no dysphagia. He died some months later from rupture of the sac.

Case IX.—No. 21650. B. T. H., male, aged forty-three years. Customs inspector. Patient entered the hospital complaining of an aneurysm. He had had syphilis. For several years he had had a sharp pain under his right sternum. This pain radiated into his right shoulder and the right side of his neck, also under his right scapula. There was considerable difficulty in talking and swallowing, but no dyspnea. Upon examination a round prominence, 7 cm. in diameter, was found in the second right interspace. There was a definite expansile pulsation and systolic and diastolic murmur. December 6, 1907, 11 feet of wire were inserted into the aneurysmal sac and a 10 milliampère current was run in for one hour. The patient showed no marked im-

provement, and on March 7, 1908, the aneurysm was wired again. Eleven feet of wire were inserted and 10 to 14 milliampères run through for twenty minutes. Six weeks later the patient was discharged improved. The tumor still remained but the pulsation was less. Systolic and diastolic thrill were still felt. There was no pain and the patient felt very well.

Case X.—No. 22027. H. L., male, aged thirty-nine years. Married. Farmer. Diagnosis, thoracic aneurysm. Patient complained of pain in the right chest and right arm. He denied syphilis. About a year and one-half previous to admission he was kicked in the chest by a mule and suffered great pain here and in the right shoulder and arm ever since. Four months after the injury he noticed a pulsation in the right upper chest. This has become more marked, and there have been sharp pains in the chest and left scapula so that he has been unable to walk. Upon examination there was a marked pulsation in the second right interspace over which a systolic murmur could be heard and a heave could be seen and felt. There was no tracheal tug. Upon fluoroscopic examination by Dr. Baetjer, a sacculated aneurysm was made out. On March 3, 1908, 11 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 20 milliampères was run in. The patient improved after the operation, but developed a left hydrothorax, for which he had to be tapped several times. He was discharged three months after operation in fairly good condition. There was, however, a marked systolic pulsation in the first and second right interspaces and a heaving impulse over the rest. There was no pain.

Case XI.—No. 23359. J. S., male, aged twenty-five years. Blacksmith. Diagnosis: thoracic aneurysm. Patient entered the hospital complaining of palpitation of the heart. He denied all venereal infection. About one year previous to admission, while lifting a heavy wagon, he was seized

with a violent pain in his left shoulder which radiated down his left arm. This was accompanied by severe palpitation of the heart. Since that time the pain has continued and the patient has been troubled a great deal with palpitation, shortness of breath on exertion, a dry cough, and inability to sleep. Upon examination there was a bulging of the whole left chest, and on palpation of the second and third interspaces a pulsation of a rather expansile character could be made out. Over this area there was great tenderness. A systolic and diastolic thrill could be felt. On December 18, 1909, 12 feet of wire were inserted into the sac and for one hour the current varying from 10 to 40 milliampères was run through. The patient was discharged four months following the operation in good condition. The heave and pulsation could still be felt in the left chest and the bulging was still present, together with the systolic and diastolic murmur, but the pulsation was considerably diminished and the pain had entirely disappeared.

Case XII.—No. 23652. Dr. S. M. O., male, aged sixty-eight years. Diagnosis, abdominal aneurysm. The patient entered the hospital complaining of colic-like pain in the abdomen. He denied all venereal infection. He had been losing weight for several years and of late had been suffering pain in the abdomen. This became so severe that morphine was necessary to obtain relief. Six months previous to admission he noticed a mass in the epigastrium which was quite tender. He was a heavy drinker and smoker and had lost sixty to seventy pounds. On February 23, 1909, Dr. Halsted put one of his aluminum bands on the aorta just above the renals. Following this there was for a time a decrease in the size of the tumor. Gradually, however, the aneurysm slowly began to increase in size and the pain became so terrific that wiring was advised. On March 12, 1909, therefore, 11 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 40 milliampères was sent into the sac. The

patient's condition was not improved by the operation and gradually lost ground, until death ensued seven weeks after the first operation and four weeks after the second.

At autopsy an abscess was found in the right ileo-psoas muscle, originating about the band. There was a sacculated aneurysm, inside of which around the wire there was a beautifully healed organized clot. The patient had died of an infection.

Case XIII.—No. 25784. J. B., male, aged forty-eight years. Married. Laborer. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of tumor in the chest. He had had a suspicious syphilitic history. He was a rather heavy drinker. For four months previous to admission he suffered from pain in the right side of his head so that he could not work. His voice became hoarse and he was troubled with a cough and bloody sputum. He occasionally had pain in the right chest, shortness of breath, and orthopnea. Upon examination there was found a great bulging in the right upper chest, wide area of pulsation to the right of the sternum, pulsation being of an expansile character. There was a faint systolic thrill to be heard; no tracheal tug. May 6, 1910, 11 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 40 milliampères was sent through the wire. Three weeks later the patient was discharged subjectively markedly improved, but the condition in the chest was about the same.

The patient died November 2, 1911, cause unknown. (Personal letter from his wife.)

Case XIV.—No. 25816. H. L., male, aged thirty-six years. Married. Laborer. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of pain in the right side. Denied all venereal infection. For three and one-half months he had had a cramp-like pain in the right chest, so much so that he was unable to work and unable to sleep. He had a slight cough. Upon examination

there was a visible pulsation in the second right interspace, where a forcible heaving impulse and faint thrill could be felt. There was a diastolic and systolic murmur to be heard and a definite tracheal tug was present. The Wassermann reaction was positive. On April 22, 1910, 12 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 40 milliampères was run through. The patient was discharged three weeks later much improved. No more pain, but the pulsation in the chest was about the same.

Case XV.—No. 25817. E. G., male, aged forty-eight years. Laborer. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of pain and swelling in the chest. He had had a syphilitic infection and was a hard drinker. For seven months previous to admission, following the lifting of a heavy weight, the patient became suddenly very weak. Since then he has had dizzy spells and a dull pain in the upper right chest and arm, especially at night. For one month he had noticed a swelling in the right chest which has been getting larger. His Wassermann reaction was positive. Upon examination there was a pronounced bulging tumor, about the size of a small lemon, having an expansile pulsation to be seen in the second and third right interspaces. There was a systolic and diastolic thrill. On April 22, 1910, 11 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 40 milliampères was sent through the wire. For a time the tumor, pulsation, and pain had decreased, but just before dicharge four months after operation the tumor began to increase in size and again the patient began to suffer pain and considerable dyspnea.

Case XVI.—No. 26914. Dr. M. W., male, aged thirty-seven years. Single. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of an aneurysm. He had had a syphilitic infection. He was a moderate user of alcohol and tobacco. For four years he had been a great

sufferer from angina pectoris. In 1908 he noted a pulsation in the second left interspace, following which he had sharp pain in the left chest, radiating down into his back and shoulder. Morphine was necessary to obtain relief. In 1910 a definite bulge in the region of the left third rib was noted, this increased slowly and the pain became a great deal worse. Upon examination there was a bulging swelling in the left upper chest between the first and third ribs, the pulsation being of an expansile character. There was a systolic and diastolic thrill. On November 18, 1910, 12 feet of wire were inserted into the aneurysmal sac and for one hour a current varying from 10 to 40 milliampères was run through the aneurysm. The patient was discharged four and one-half months after operation greatly improved, both subjectively and objectively, and from a personal letter the patient said that he is now enjoying fairly good health (December, 1911).

Case XVII.—No. 27272 and 27758. F. G. J., male, aged thirty-six years. Married. Salesman. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of pain in the left chest and a tumor. He had a suspicious syphilitic history. He had always been a hard drinker. About two years previous to admission he began to have a dull ache in the left chest, worse at night. One year after this he noticed a change in his voice; he became easily exhausted and short of breath on exertion. A peculiar brassy cough developed shortly after this, with swelling in the left chest, which also increased steadily in size. All his symptoms became gradually worse, especially the pain which radiated down his left arm. Upon examination there was a heave to the whole upper chest to the left of the sternum. In the second interspace there was a definite pulsation and swelling, the pulsation being of an expansile character. There was a systolic and diastolic thrill to be made out. On January 29, 1911, 10 feet of wire were inserted into the aneurysm, and for one hour a current varying

from 10 to 40 milliampères was run through the wire. One month later he was discharged in good condition. He had almost no pain. His voice was still husky, but the cough was relieved.

On May 4, 1911, the patient was readmitted. He said that following his discharge he continued to improve until one week previous to his second admission; after unusual exertion he noticed a dull pain in the left chest about the position of the old aneurysm. Following this he noticed a prominence in this area and a pulsation. There was no pain or discomfort. Upon examination there was a definite pulsating tumor in the third left interspace. There was no pulsation in the back. A tracheal tug was present, but not especially marked. On May 8, 1911, the aneurysm was wired again. Ten feet of wire were inserted and the current run through from 10 to 40 milliampères for one hour. Following this operation the pulsating tumor seemed to become solid and the pain disappeared. On June 4, 1911, however, after having been up and about for several days, the aneurysm suddenly grew larger and caused great pain. Its diameter became 12 cm., whereas before this it was 5 cm. The skin over it was red and tender and the patient's temperature was 102. On June 6 the aneurysm was wired again. The idea of this operation was to block pressure from below and to strengthen the anterior wall of the sac which had apparently given way. The needle was therefore passed into the aneurysmal sac on a slant and the wire wound on a smaller spool than usual in order to get a smaller curve. As in the previous wiring, the needle apparently passed through a thick clot before the sac of the aneurysm was entered, and after two feet of the wire had gone in with comparative ease it seemed to block, and the operator felt that the wire probably twisted on itself, for after a little pressure a new start was given and another foot or two passed in easily. This performance was repeated several times, until finally it was impossible to pass in any more

wire, about 9 feet having been inserted. The current was then run in as in the previous operation. The operation was done in the ward and the patient did not have to be lifted from his bed.

Four days later, June 10, 1911, the aneurysm was very firm and there was only a slight pulsation. There was considerable pain, however. The temperature was normal. On June 20 there was no expansile pulsation, very little pain, a slight infection over the aneurysm, however, broke through the skin.

He was discharged on July 17, 1911; able to get about.

Case XVIII.—No. 27285. G. B., male, aged forty-four years. Laborer. Single. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of pain in his right chest. He denied all venereal infection. He had always been a hard worker, had used alcohol moderately. He had had pain in the upper right chest for two and one-half months, worse at night, and was of a sharp and shooting character. It sometimes radiated down the arm, shoulder, and the neck. He had some dyspnea. His symptoms had become worse just before admission. Upon examination, there was a systolic heave to the manubrium and the right upper chest. There was a localized pulsation in the first right interspace, where a systolic pulsation and thrill were felt together with a diastolic shock. There was a systolic and diastolic murmur over the heart. His Wassermann was negative. On February 6, 1911, 11 feet of wire were passed into the aneurysmal sac and the galvanic current run in from 10 to 40 milliampères for one hour. There was marked diminution in the pulsation, and the pain had almost disappeared on February 17. February 24 the patient was discharged in good condition.

Case XIX.—Nos. 27915 and 27966. H. H. H., male, aged thirty-five years. Married. Electrician. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of an aneurysm. He denied syphilis, and there

had been no secondaries. His Wassermann was negative. He had been a steady drinker for three years and had used a good deal of tobacco. He has had pain in the upper left chest for nine months. This pain later on went over to his right upper chest and down his right arm. He had suffered from shortness of breath and palpitation of the heart but his chief complaint was the constant pain, which necessitated great quantities of morphine. This pain radiated into his right arm, back, and shoulder. Upon examination there was a pulsating tumor in the right upper chest, most marked in the third right interspace. The pulsation had an expansile character and a to-and-fro murmur could be heard over it. On fluoroscopic examination by Dr. Baetjer a pulsating mass could be seen behind the sternum rather high up. There was some bulging to the right. On June 14, 1911, 11 feet of wire were passed into the sac and 20 milliampères of current were sent into it for one hour. The patient was unable to stand more than 20 milliampères. On June 20 there was definitely less pulsation and no pain. On June 27 the patient was discharged much improved.

Case XX.—No. 28689. G. W., male, aged twenty-seven years. Laborer. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of shortness of breath. He had had syphilis in 1908, and had been a heavy drinker. For nineteen months he had pain in his chest. One month after the pain began he became hoarse, and five months after he became dyspneic and had palpitation of the heart. The pain radiated to his shoulder and right arm. He had had a cough since the onset. All his symptoms gradually became worse. Upon examination there was a prominence of the second and third left costal cartilages. Near the sternum there was a definite pulsation to be seen. No shock but soft diastolic blow could be heard over the area. The left arterial pulse was delayed. There was a definite tracheal

tug. On November 3, 1911, 11 feet of wire were passed into the sac. No spurt of blood followed the introduction of the needle as is usual. It felt as if the wire were passing through a soft clot. After the introduction of a considerable amount of wire the usual sudden pulsating stream of blood appeared and it was evident that the wire had entered the sac. A current of from 10 to 40 milliampères was passed through for one hour.

On November 9 he began to complain of great pain in his right breast. His abdominal muscles became rigid. This condition continued and a few days later grew considerably worse, so that great quantities of morphine were necessary to relieve him. He became dyspneic. Nothing definite, however, could be made out upon examination. He finally died.

At autopsy the anatomical diagnosis was aneurysm of the descending aorta, multiple aneurysms of the thoracic and abdominal aorta. Complete thrombosis of the superior mesenteric aorta with collateral circulation established. Aneurysm of the right renal artery with a mural thrombosis. Abscess in the subcutaneous tissue around the wire. Aortic insufficiency and bronchopneumonia. Numerous strands of wire extended down throughout the thoracic and abdominal aorta to the orifice of the renal arteries. Thromboid masses were adherent to the wire throughout its course. A loosely adherent thrombus was found at the bifurcation of the iliac arteries. There were three definite aneurysms of the aorta. The one which was wired in the ascending aorta, another in the descending aorta, and a third just below the celiac axis. The immediate cause of death in this case was probably bronchopneumonia.

Case of Drs. C. L. Jones and C. S. Hamilton of Columbus, Ohio. (Personal communication.)

L. R. T., male, aged forty-eight years. Diagnosis: thoracic aneurysm. The patient entered the hospital complaining of pain in the chest and back. He denied all venereal

infection. Had always been a hard drinker. On June 16, 1905, he was thrown from a street car, picked up unconscious, and carried to the hospital. His trouble dates from that injury. Ever since he has suffered great pain in his chest. It was not very severe at first but later increased in severity, and radiated from his right side to the back between the shoulder-blades. He finally became so uncomfortable that he was unable to sleep in the recumbent position. He suffered greatly from shortness of breath and became dizzy on slight exertion. His voice became husky and he developed a dry cough. Upon examination a heaving impulse could be felt to the right of the sternum, most marked in the second interspace. No thrill could be felt. A tracheal tug was present. No murmurs could be heard over the site of the aneurysm. Blood pressure was 132. On February 24, 1905, 19 feet of silver alloy wire were passed into the aneurysmal sac and the current was run in for one hour, varying in intensity up to 20 milliampères. Following the operation all pain ceased. Pulsation in the chest was distinctly less and the shortness of breath gradually disappeared. The patient left the hospital twenty days after the operation in good condition and has remained so up to about a month ago, when his old pain recurred. At present he is living in Denver and is considering being re-wired.

Case of Dr. Joseph R. Eastman, *New York Med. Jour.*, December 15, 1906.

The patient was a male, aged forty-one years. Waiter. He denied all venereal history, but was a heavy drinker of beer and whisky, and was a heavy smoker. About six months before admission to the hospital he noticed a pain in the left side above the cardiac region. This pain was sharp and shooting in character and very severe. It radiated through the shoulder to the posterior scapular region and became continually worse. He coughed only during the last week before admission. At times his voice was almost completely lost. Upon examination there

was a large area of distinct heaving pulsation above the left nipple. There was an expansile pulsation in the fifth right interspace and a distinct bulging above the left nipple. There was an oval palpable tumor one and one-half inches in diameter above the left nipple line upon the second and third rib and second interspace. No bruit could be heard over the tumor. On February 13, 1906, 15 feet of No. 28 silver wire were inserted into the cavity of the aneurysm. After the introduction of the wire the pain became worse, and three weeks later, five feet of the wire were removed. Orthopnea developed and gradually became worse. The left chest became filled with a serosanguineous fluid, which was drawn off one month after the operation.

The patient died suddenly, with a profuse hemorrhage from the mouth on May 4, 1906.

At autopsy there was found a large aneurysm just above the heart, which through pressure had ruptured into the trachea. At the conclusion of this article there is a note which reads, "Galvanism was not employed after the introduction of the wire for the reason that the dangerous condition of the patient forbade it."

Case of Drs. J. M. Anders and J. P. Mann. *Transactions of the College of Physicians of Philadelphia,* 1908, volume 30.

The patient was a colored man, aged thirty-six years. He entered the hospital complaining of a painful throbbing lump in his chest. He had had syphilis, but claims the primary sore had appeared only four months previous to his admission. He had always been a heavy drinker. Four years previous to his admission he noticed a dull boring pain under the sternum. Soon a small painful throbbing protuberance appeared to the right of the midsternal region. He had at times suffered from a severe cough, marked dyspnea, and general weakness. Four days prior to admission, during a "spree," he suddenly felt a sharp pain, accompanied by a sense of something giving way in

the chest. This was attended with a smothering sensation, and at the same time he noticed that the tumor became rapidly larger. On examination there was a conical tumor mass projecting from the thorax at the right edge of the sternum. It was about two and one-half inches in height and three inches in diameter at the base. There was a definite expansile pulsation to be felt, and a systolic murmur to be heard over this tumor. On January 29, 10 yards of fine silver and copper wire were inserted into the aneurysmal sac. Almost immediately the expansile pulsation was markedly diminished and the tumor mass was less prominent. About two weeks later an additional slight elevation above the second right rib was visible. This also gave an expansile pulsation and slowly increased in size, so that on February 13 several yards of fine silver wire were inserted into this. On February 28 the entire surface of the primary tumor mass sloughed off, exposing the wire coiled up within the aneurysmal sac. Following this there was a slight oozing of blood occasionally to be seen, but the wound gradually healed by granulation. The patient gradually recovered his strength, and the tumor mass, which was wired, showed only very slight pulsation. On March 10, 1908, the patient was in good condition. (Apparently no current was used in this case at all.)

Bibliography

A. A. Eshner. Amer. Jour. Med. Sci., 1910, cxl, 496.

Leonard Freeman. Trans. Amer. Surg. Assoc., 1901, xix.

H. A. Hare. Therap. Gaz., July, 1900, 1903, and 1905, p. 433.

G. L. Hunner. Johns Hopkins Hosp. Bull., November, 1900.

Rudolph Matas. Keen's System of Surgery, v, 216; Trans. Amer. Surg. Assoc., 1902; Ibid., 1905; Annals of Surgery, 1903.

Joseph Ransohoff. Med. News, 1886, xlviii.

D. D. Stewart. Amer. Jour. Med. Sci., 1892, clv, 422; Philadelphia Med. Jour., November 12, 1898.

DISCUSSION ON THE PAPERS OF DRS. KIRCHNER AND FINNEY

Dr. Joseph Ransohoff, of Cincinnati.—I have taken a great deal of interest in the treatment of aneurysm of the aorta, and I am not surprised to learn that of the many cases in which the aneurysms have been wired, only two are alive. I believe that has been the history of the treatment of aneurysms of the aorta.

At the meeting of the American Medical Association held in St. Louis fully twenty-five years ago I presented a specimen like the one presented by Dr. Finney, of a negro into whose aneurysm I introduced several feet of silver wire—I do not recall exactly how many feet—and had the man go into collapse. I thought I had touched the semilunar valve, and quickly withdrew the wire. It was replaced. He made a beautiful recovery for four weeks, and then exactly that to which Dr. Finney has called our attention occurred, namely, as a result of the wiring a firm clot was produced which made the blood current go in another direction, and in this individual, who is getting along beautifully, rupture soon occurred into the pleura, and he was found dead in bed.

In the pre-antiseptic days when wiring was done we did not have any difficulty with infection. That danger was no greater then, I imagine, than it is now. The patients, however, did just as well under the old method, I think, as they do now with the aseptic method, that is, the prognosis from wiring is not particularly good. I have no doubt clotting is facilitated considerably by the addition of the electrolytic effect.

There is one method of treating aneurysms of the aorta which has been neglected of late. The best results which I have obtained in the treatment of aneurysm of the arch of the aorta have been in cases in which I have made a mistake in diagnosis; that is to say, a few cases in which I have tied the innominate and common carotid simultaneously under the supposition that I was dealing with an aneurysm of the innominate; but autopsy, which was made four years after the tying of the vessel, proved that the aneurysm involved the aorta and simply had extended into the innominate. Of course, with the *x*-ray we are able to distinguish absolutely one form of aneurysm of the innominate from an aneurysm of the arch of

the aorta; but it may be difficult with *x*-ray examination or with radiographs to determine positively whether the aneurysm which we see at the arch of the aorta and believed to be in the innominate is not in its beginning an aneurysm of the arch of the aorta. One important point is the absolute certainty with which we can make the diagnosis from pulsation. If I understood Dr. Finney correctly, a pulsation wave is shown by fluoroscopic examination and also by the *x*-ray. I had a most dramatic evidence of the futility in some cases of insisting on a diagnosis of innominate aneurysm by the absence of the double pear-shape and by the absence of pulsation under the fluoroscope. I reported this case in Buck's *Surgery*. I saw a man in one of the wards who was *in extremis* from intense dyspnea. Under cocaine anesthesia I introduced a tube into the trachea, and the man rallied. There was a change in his color from a dark blue to a reactionary hyper-red, and he was given a new lease of life. I saw this man later in consultation, and it was shown that he had something in his mediastinum pressing on the trachea. I did not know what it was at the time, as an *x*-ray was not taken. There was no pulsation whatever. A tracheoscopic examination was made by an expert, who came upon a stricture and found no pulsation in the wall of the trachea whatever. The man went from bad to worse. There was a little elevation of temperature. It was determined that he had an abscess of the mediastinal gland, and under cocaine anesthesia it was determined to do a resection of the sternum. This was done, and suddenly there was a gush of blood from the man's mouth, and he died on the table within a minute and a half. It is needless to state it was the most dramatic thing I have ever seen in my professional career. Autopsy showed an aneurysm not larger than a peach. It had a firm attachment to the trachea and it ruptured there.

I reported a case of wiring before the American Medical Association. It is to be found in the *Medical News* of 1886. Silver wire was introduced twice. The autopsy, made I think six weeks after the operation, showed rupture into the pleura. One loop of wire was in close proximity to the semilunar valve.

Dr. Randolph Winslow, of Baltimore.—I have been very much interested in the paper of Dr. Finney, for the reason I have at this time a man with forty-five feet of wire introduced into a supposed thoracic aneurysm from the arch of the aorta. The remark made by Dr. Ransohoff, that it is difficult to

determine whether it is an innominate or an aortic aneurysm, is one that I can appreciate very much.

Here is the clavicle. (Indicating on blackboard.) The tumor is in his neck something like that, up as high as Adam's apple, and pulsating very freely without any bruit. A skiagraph has been made which shows the outlines of the heart, and this is running into it. These two points here (indicating) on the left side were almost as thin as paper. I told the patient the only thing that would do any good would be to introduce wire into the aneurysm, and I did not know whether that would benefit him very much or not. I introduced about fifteen feet of wire up in this corner (indicating), and about five feet up here. Subsequently I introduced some more here (indicating), and as a result of that the artery has become very much harder and has ceased to pulsate. But that happened which was spoken of just now. Doubtless the increased pressure in the course of a month or six weeks caused pressure in other parts, so I put some more wire in here (indicating), and on Sunday I found him with his aorta more pouched up here (indicating), and in urgent danger of bursting, and I told my assistant to put in some more wire. He put some more wire in there. When I saw the patient on Monday the aneurysm was not pulsating so much.

Another point that interested me considerably was as to the needle and the kind of wire that is put in. Not having had at hand all kinds of needles, it was the ordinary aspirating needle I used, and the wire was the ordinary silver wire, which I find answers as well as anything else in cases of aneurysm. I turned on also forty milliampères of the galvanic current, and continued it for over half an hour.

This is the only experience I have had. A point of interest to determine is whether it is an aneurysm of the innominate or an aneurysm of the aorta. I am inclined to think it is an aneurysm of the aorta. It is almost square in shape. There is no bruit. There is some metallic voice. There is a little cough, which was worse before the wire was introduced. It may be an anomalous form of aneurysm.

Dr. W. P. Carr, of Washington, D. C.—I want to call attention to one thing that may happen in a case of this kind. I had a large aneurysm of the aorta that I introduced wire into, as I thought, but I did not. This man had a tremendous bulging out of the shoulder-blade on one side, and the *x*-ray

showed it was an aneurysm. As a matter of fact, the sac of the aneurysm was above like that (indicating on blackboard), and out here was a blood clot, which was a soft, partly organized blood clot. I introduced a needle at this point (indicating), and put in, I think, about fourteen feet of wire, which was coiled up supposedly in the aneurysm, but it was in the clot, and only a little of the wire got into the aneurysm proper. It formed a very nice clot. But in a short time there was a rupture of the lower part of the aneurysm into the pleura, and the whole pleura was filled up. It was the largest aneurysm I have ever seen. It weighed something like twenty pounds.

With reference to the paper of Dr. Kirchner, I have done some of these operations. The Matas operation is very easy and satisfactory where the aneurysm is of that nature and where the vessels are in good shape.

I operated on one case of popliteal aneurysm. I do not know whether to call it traumatic or idiopathic, but it was due to bending of the knee, although there was no direct injury. I dissected out the sac, sewed up the wound in the artery, and there was no trouble following it.

Dr. Rudolph Matas, of New Orleans, Louisiana.—I cannot allow the paper of Dr. Kirchner to go by without a word of thanks and appreciation for his very instructive and excellent reports. I am especially thankful to him for the aid such reports as his are giving me personally, in compiling the statistics of endo-aneurysmorrhaphy. These are steadily accumulating and now number over 180 observations. I have references to 8 more cases which I have not been able to include in my statistics, because I have not been able to obtain the necessary details from the operators. I wish to avail myself of this opportunity to appeal to the members of this Association and to other surgeons who may be present who have performed this operation, to follow Dr. Kirchner's good example, and to report their results whether these be good, bad, or indifferent.

I am just as much interested in the failures as I am in the successes, because we are simply trying to get at the facts. Of course, I would like all the results to be successful, but we know that there is no surgical cure for aneurysm that is infallible, or that may claim to be perfect and uniformly satisfactory in dealing with so complex and complicated a disease as aneurysm as we find it in the variable conditions of practice. There are bound to be failures in a certain unavoidable percentage of

advanced or complicated cases, in which every conservative method is challenged, no matter how simple or effective it may appear to be. When failure occurs, we must try to ascertain the reasons for the failure in order that we may learn how to avert it, or at least when to expect it. For this reason, I am anxious to gather the data which can only come from a large series of observations, which will help me in arriving at conclusions that will be of service in establishing the comparative merits and indications of the three procedures, which I have embraced under the general title of endo-aneurysmorrhaphy. With 200 cases or more to draw from, I will soon be able to make a fuller statement of the status of the operation than those which I have already published. I can only say, at present, that in a general way the reports are like those of Dr. Kirchner, most encouraging and complimentary of the good opinion expressed by the many surgeons, who have favored the operation by a personal trial. I would like the members of this Association and other surgeons present to tell me also about the cases in which they did not believe the operation was justified or indicated, especially in connection with peripheral aneurysms in which they thought other methods preferable. The more the data supplied me the more likely will I be to arrive at helpful conditions.

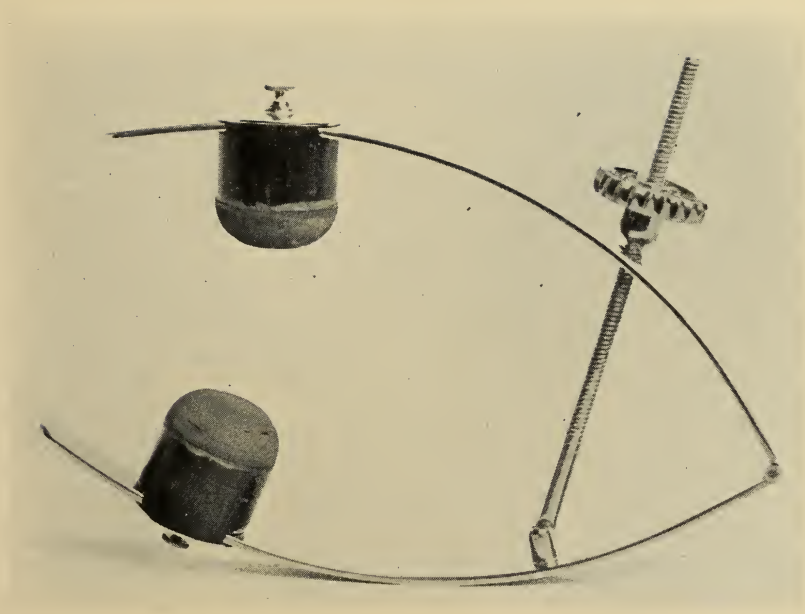
I appreciate Dr. Carr's excellent remarks and greatly value his very instructive experience. He has made an excellent point, showing the chief difficulties in dealing with intrathoracic aneurysms.

I am very much pleased with the very prudent and conservative estimate of the value of Moore-Corradi method, which has been so carefully presented by our eminent Fellow, Dr. Finney. This cautious attitude is especially becoming in one so able, and who has had so large an experience in the method as he has. On a previous occasion (Trans. Southern Surg. Association, 1900) I discussed at considerable length the treatment of abdominal aortic aneurysm by wiring and electrolysis, and the conclusions I then arrived at, based upon my personal experience, and the evidence furnished by all the reported cases published up to that time, were certainly not encouraging. This procedure, I regard as in the light of a surgical adventure, which would be justified solely in saccular aneurysms with imminent danger of death from a rapid progress of the disease with threatened rupture of the sac and associated

with great suffering. Even then, the operation I fear is only a placebo which has little to recommend it, and can only be undertaken at the urgent solicitation of the patient after a thorough understanding that the chances are no less than 70 per cent. against permanent recovery.

In this view I was sustained at the time by our distinguished Vice-President, Dr. Hunner, who, including in his report all the reported thoracic aneurysms, arrived at practically the same conclusions. If our radiographic and fluoroscopic methods of investigation improve sufficiently to permit of a distinct clinical differentiation between the sacculated and the fusiform aneurysms of the aorta, the method of wiring and eletrolysis may find a more definite application in the strictly sacciform cases. But even then the danger of perilous migrations of the wire and rupture of the sac, as well as gangrene of organs supplied by important branches obliterated by coagulation, would make it preferable to attack this most formidable type of aneurysm by direct surgical intervention aiming at the obliteration of the orifice of supply by intrasaccular suture and infolding of the sac. Since the Meltzer-Auer method of artificial respiration has come into practice the hope of attacking intrathoracic saccular aneurysms by more direct surgical methods has increased. My friend and assistant, Dr. Allen, has, under my direction and for some time past, conducted a series of experiments which would justify the hope that exploratory thoracotomy can be reasonably applied in the earlier stages of aneurysm. We have been very successful in this procedure as applied to dogs, and his results in the partial obliteration of the aorta by plication of this vessel are certainly very interesting and suggestive of future possibilities in human surgery as applied to this condition. We have found that obliteration by plication of the aorta is far more satisfactory in dogs than obliteration by the use of bands or other compressing contrivances.

In connection with the discussion on Drs. Finney's and Kirchner's papers, I will avail myself of the opportunity to exhibit the form of arterial compressor which I now use for testing the efficiency of the collateral circulation in the extremities. In my Presidential Address before the American Surgical Association held in New Orleans, 1910 (see *Transactions of the American Surgical Association* for 1910) I described a test which was especially applicable in determining whether the oblitera-



Dr. Matas' improved arterial compressor for testing the efficiency of the collateral circulation.

tion of the main artery of the limb could be obtained without risk of gangrene. For this purpose I resorted to the form of mechanical compressor known as the Massachusetts General Hospital Compressor. This compressor has the disadvantage that it compresses too great a sectional area of the limb while compressing the main artery. To eliminate this objection and limit the compression of the collaterals to the strictest minimum, I have devised the appliance which I now show you. It is applied to the limb so that one of the knobs of the compressor is adjusted directly over the artery, and the other knob is applied at a point diametrically opposite. In this way a firm hold of the artery is obtained which leaves all the collaterals free and unobstructed as they lie outside of these two pressure points. Apart from this improvement in the compressor, the test for the efficiency of the collateral circulation is applied as described in the address previously referred to. (See, also, *Annals of Surgery*, January, 1911.)

Dr. J. Garland Sherrill, of Louisville.—We learn a great deal by our mistakes. Last year I reported a case in which I made an effort to tie the subclavian for aneurysm through the chest posteriorly, and at the operation I discovered that I had to deal not with a subclavian aneurysm on the left side but one of the aorta. This tumor appeared something like this (indicating) above the clavicle and inside the chest. There was another sac communicating with the first and appearing in front of the chest. I found that access to the subclavian on the left side in that position was easy. The aorta could be reached, and a diagnosis of thoracic aneurysm was clear. When I found I had made a mistake of this kind, I put a few feet of wire into the sac, the patient recovered from the operation, and the wound healed. At the end of less than ten days the patient died of rupture of the aneurysm into the esophagus.

The statement made by Dr. Ransohoff and by Dr. Carr, that it is difficult to determine whether it is an aneurysm of the aorta or not, must be considered in these cases; but with a proper reading of the skiagraph and a fluoroscopic examination we have a means of making this differentiation. One of the reasons for believing that my case was an aneurysm of the left subclavian was the difference in the pulsation of the carotid and the radial artery on that side. There was a very small amount of force in the radial artery, the pulsation being almost

imperceptible, the carotid beating vigorously, the radial pulse considerably delayed. Later I determined from the position of the aneurysm why this occurred. This aneurysm came from the deeper region of the left subclavian artery.

Dr. Kirchner (closing the discussion on his part).—Some nine years ago I assisted at an operation of wiring for inoperable aneurysm of the thoracic aorta. From observations made at that time, and at the subsequent postmortem examination, and in examining at autopsy numerous other cases of thoracic aneurysm, I have been discouraged in the use of this procedure. I felt that unless one could close the opening in the artery from which the blood was coming, the results would not be satisfactory. Granted we would obtain a clot in one portion of the sac, the tumor would expand in another direction, and on that account I do not see how a lasting result could be obtained. The results of the Matas operation have been so successful, as I have observed them, that I believe the operation may be applied to certain traumatic conditions involving the abdominal aorta. I wish to thank Dr. Matas for his kind discussion, and for the additional information I have gotten.

Dr. Finney (closing).—Just a word to call attention to the fact which I tried to emphasize in my paper, and that is this: we are dealing with an absolutely hopeless condition in which nothing else offers a single ray of hope to the patient, and a sudden catastrophe may happen at any time, and if we can do anything at all for such a patient it seems to me worth while. That is all we claim for this method. It is easy of application. It is accompanied with a certain amount of risk which ought to be explained to the patient and his friends before operation. If that is done, and in your efforts to relieve you shorten his existence, you have relieved him of an additional amount of suffering. I think the operation is a perfectly justifiable one in an otherwise hopeless condition. If, on the other hand, you are able to relieve one case in a hundred it seems to me ample justification for the employment of this operation.

As to the diagnosis, the ordinary *x*-ray plates are of little value in intrathoracic aneurysm; but by the use of the fluoroscope in the hands of an expert, it does seem to be possible to differentiate as to the variety of aneurysm with which you are dealing. I have watched these cases through a period of years with Dr. Baetjer, who is the *x*-ray physician in connection

with the Johns Hopkins, and I have never yet seen him make a mistake in these cases. Of course, he is not infallible, and he may make a mistake tomorrow; but so far, in all of the cases that I have operated upon, he has been able to make a correct diagnosis with the aid of the fluoroscope. He places little value on the ordinary *x*-ray photographs.

EXPERIMENTAL STUDY OF THE ARTERIES IN SHOCK

By Willard Bartlett, M.D.
St. Louis, Missouri

At the suggestion of Dr. Joseph Erlanger, our physiologist in St. Louis, this study was undertaken to determine if possible whether the arteries are dilated or constricted in shock in the dog. As you very well know, scientists are divided into two camps on this subject, and it appeared to us that a direct method of measuring the rate of inflow into the arteries might determine definitely this question. So an apparatus was constructed by the use of which salt solution, under a pressure higher than any obstacle in the veins could offset, was injected peripherally into the arteries, first, with the dog in the normal state, and second, after the dog had been reduced to shock, the inflow being measured in cubic centimeters by a stop-watch. It was hoped in this way to determine their variations—rate of inflow, whether vasodilatation or vasoconstriction obtained in shocked animals. The femoral artery in about half of the experiments was taken, and the splenic artery in about half of the others. In the case of the splenic we ligated the short branches to the spleen itself, and used only the short terminal branch, which anastomoses with coronary artery. The operation in neither case interfered with the vitality of the tissues involved. We did not take a kidney vessel or other abdominal vessel, because by dividing it and inserting a cannula distally we would have been injecting fluid into tissue which no longer

had any other circulation, and would not give us results which could be utilized on living animals. The blood pressure of the animals was reduced by all sorts of traumatism, which did not involve the area in which the salt solution was injected.

The results obtained justify us in concluding that vasodilatation is unmistakably an accompaniment, if not the result of shock, and every experiment coincided with all others, and the average rate of inflow was more than 35 per cent. greater in shock than in the normal animal. All of these results being alike, we conclude that we were not dealing with an accidental finding.

Certain objections to the method arose in our minds. The first question which any physiologist would ask is, Are we really dealing with vasodilatation. We cut the sciatic nerve (in the femoral region into which we were injecting salt solution), thus dividing nearly all the fibers which reach the femoral vessels and found that the inflow of salt solution in the femoral artery after this maneuver increased, we knew thereupon we were dealing with vasodilatation and not with something else.

Another question which arose in our minds was whether this fluid was running through the collaterals and not through the capillaries of the region on which we were operating. By stimulating the vagus the general blood pressure was lowered (but it did not influence the rate of inflow), as would, of course, have been the case had the salt solution been flowing out through the collaterals into the arteries rather than through the capillaries into the veins.

The objections which have been urged against vasodilatation by the adherents of the vasoconstriction idea have been, in the first place, that a patient in shock has a pale and cold skin. This fact merely proves that there is no blood in the skin, it having been shown years ago that the blood of a dead individual leaves the arteries and accumulates in the great veins. Second, the arteries of the retina are small

in caliber, contain no blood, and simply show the same thing. No evidence has been brought forward to show that this is anything else. For this last reason the veins bleed more profusely in shock than is their wont.

The fact that cutting the sciatic nerve in shocked animals (Seeling and Lyon) increases the rate of outflow merely shows the vasomotor effect on the femoral is not annihilated.

In our experimental work it was highly interesting to find that the arteries do not behave in the same way in shock and in hemorrhage. I have heard surgeons say that in cases of shock so-called, they have found the belly full of blood. We found that when the animals were reduced to a state of shock the rate of inflow of salt solution into the artery was greatly increased, 35 per cent. over the normal, and there was no apparent attempt on the part of nature, when the dog was thoroughly reduced, to combat this vasoconstriction. We bled a few dogs in order to hasten the pull of pressure, and found that the bleeding immediately decreased the rate of inflow, evidently vasoconstriction even when the bled animal is in a state of shock. In shock itself without bleeding that does not occur.

I may say to practical other surgeons that the use of morphine in these experiments exerted absolutely no influence in inhibiting shock. Shock comes in the same way and after a lapse of approximately the same length of time (and I may say that each of these experiments covered about six hours) whether or not morphine was used.

It is with a certain degree of pleasure that I state these things which confirm the claims of our colleague, Dr. Crile, made years ago, and he has had a hard fight to hold his own that vasodilatation is one of the accompaniments of shock.

CRILE'S RESEARCHES IN REGARD TO SHOCK

SOME CLINICAL FACTS TENDING TO CONFIRM HIS CONCLUSIONS

By W. P. Carr, M.D.
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In the earlier days of medicine three great causes of death held the surgeon's hand and prevented his doing most of the major operations now safely performed every day. These three great lethal obstacles were hemorrhage, sepsis, and shock. Hemorrhage was, at first, the most dreaded of the three, until Ambroise Paré, with simple clamps and ligatures, showed how it could be controlled.

Sepsis then became a comparatively greater danger; but Pasteur disclosed its cause, and opened the way for its prevention. Lister, Koch, and many others contributed to its mastery, and then shock remained, and became relatively the greatest cause of death in surgery. Shock, often not recognized, and called by another name, but still shock. And now, one of our own associates has at least opened the way for the prevention of shock. He has opened it as clearly as Paré did the way for preventing hemorrhage. I refer to the work of Dr. Geo. W. Crile, who is the first to give to shock a clear definition and definite entity; the first to clear the subject of mystery, put it on a scientific footing, and point the way for robbing it of its danger. Crile has correlated the work of others, and added much to it by his own researches and experiments, and has demonstrated conclusively that shock is a condition of the brain cells, susceptible to microscopic definition, and consisting

mainly in a shrinking of the cell nucleus and a dissipation of the granular matter of the protoplasm.

We may now regard shock as the exhaustion, by excessive discharge of nerve impulses, of certain chemicals from the cell that are necessary for its activity. And these substances may be restored, under favorable conditions, provided their exhaustion is not too complete and the cell disrupted. This knowledge of itself is of great importance, for it is the key to what has been for years a mystery. There is no more mystery about it now than about the using up of plates and fluid in a storage battery. And, in either case, the exhaustion may be rapid or slow.

Immediate exhaustion may occur under powerful stimuli and conditions that remove all resistance to discharge, or the same result may be reached under a succession and summation of slight stimuli.

But Crile has gone much farther. He has, by patient and careful experiments, actually produced this condition in animals, both by the rapid and by the slow method, and demonstrated the change in their brain cells with the microscope. He has determined with considerable certainty what conditions will produce these changes, and that these conditions are not the same for all animals, and probably not the same for different types of human beings.

He leaves no room to doubt that shock is not caused by direct action upon the brain cells; but by impulses brought to them through afferent nerves—impulses calling for violent action or effort. They are impulses suggesting evil to the organism, nocuous or noci impulses, calling for strong efforts of defence or escape—calling for tremendous discharge of nerve impulses from the cells of the brain regulating the mechanism of escape or defence.

Pain, fear, and the pulling upon important viscera are among the more important causes of shock. But fear seems to enter as a potent factor into all the causes—conscious or subconscious fear. It is not so much pain that is past,

or even present pain, as the fear of its continuance, or repetition, that causes an animal to struggle in the grip of its captor, or a patient to squirm under a painful operation. The cumulative effect of repeated paroxysms of pain, or the fear of it, are very noticeable in removing a large number of stitches from a long incision and in cases requiring daily painful redressings for a long period. The first few stitches or redressings are bravely borne; but the summation of slight pains frequently causes complete loss of nerve after a time. For, though the muscular response to pain or fear be inhibited by the will, the brain cells continue to discharge impulses of escape or defence.

For years it has been thought that chloroform and ether prevented shock during the period of anesthesia. Crile's experiments show that this is not true, even in the slightest degree; though nitrous oxide does diminish it to a marked degree, possibly by inhibiting the transmission of afferent impulses and diminishing cell activity by a diminished supply of oxygen. Ordinary anesthesia, however, while it inhibits the muscular response, does not prevent the brain cells from receiving afferent noci suggestions, and discharging in response powerful impulses that exhaust the cells as quickly as if the muscular actions of escape or defence were fully carried out.

Noci impulses are not necessarily painful in the ordinary sense, but may be only suggestive of great harm to the individual through phylogenetic association. Tickling over the ribs or abdomen, or pressing upon these regions with a smooth point resembling a canine tooth, is not painful in the usual sense, but will cause most powerful and *uncontrollable, involuntary* efforts at escape. Crile suggests that this is due to the phylogenetic association or suggestion of animals' teeth digging into the ribs.

I have seen an hysterical condition bordering on shock produced in this way on several occasions, and know of some cases where the shock was quite severe and lasting

from a short period of tickling. Even in the average person, I know nothing that will cause more violent action than boring a finger into the rib region, and some individuals are excessively susceptible, and could no doubt be fatally shocked in this way. Indeed, it would only be a question of time with any person. It is an important fact in this connection that, while the brain changes of shock are similar to those of prolonged voluntary muscular activity, it is only under the goad of extreme necessity that voluntary exertion is ever carried to a point of exhaustion constituting shock—as we now use the word. Man, lost in a desert, in pursuit of water, or chased by wild beasts, may continue his efforts until exhausted to a degree constituting profound shock. But such efforts are hardly voluntary, they are made under the goad of thirst and fear—fear of thirst, and fear of death, and fear of pain. Ordinarily shock is never produced by voluntary exertion. It results from the *more powerful* involuntary discharge of nerve impulses under the stimuli of noci association or suggestion.

Crile has shown that these noci suggestions are always received by a peripheral receptor, a specialized nerve terminal or organ of special sense, such as the eye or ear, and carried to the brain by afferent nerves. He says the brain itself has no noci receptors and for this I shall offer presently the support of clinical observations. But no matter how brave or stoical a patient may be, nor how profoundly under the influence of ether, the automatic suggestion of danger may reach his brain through a specialized mechanism and automatically discharge his brain cells exactly as if he were in an actual struggle for his life. Special systems of noci receptors and transmitters, we may well believe, were developed during the period of our evolution when adverse environment made them a life saving necessity, and even now, while some of the systems are more trouble than use, we could not afford to dispense with the greater part of them.

Yet, there is surely a more highly organized set of such receptors and transmitters in some persons than in others, just as there is this difference in animals.

It has been shown that animals fully protected by armor have no sense of fear and no fear receptors. Their response to a suggestion of danger is simply to surround themselves with a shell of bone, as in the case of the turtle and armadillo, or a still more effective shell of odor, as in the case of the skunk. Such animals are almost immune to shock.

The carnivora respond by vigorous muscular defensive efforts and are, of course, more susceptible to cell exhaustion.

Animals depending, like the rabbit and deer, upon fleetness of foot for their safety are constantly exercising eye, ear, and nose for a hint of danger and have developed a splendid set of noci receptors. Such animals Crile found very susceptible to shock through fear alone. Some persons are much like skunks in this respect, as well as in others, and some are more like rabbits. Or it might sound better to compare them to armadillos and deer, or gazelles.

Further experiments showed that division of the afferent nerve paths between the seat of an injury and the brain, or blocking the nerves with cocaine injections, does prevent shock in animals, even when the trauma is prolonged and of a nature to cause it in extreme degree. This led Crile to his anoci-association operation, and the practical demonstration that shock can be almost entirely prevented in some severe operations, even in the most susceptible patients; those suffering from Graves' disease.

I have frequently, in the past, noted certain clinical phenomena for which I had no explanation until it was furnished me by Crile's papers. These facts also strongly tend to confirm some of his deductions and conclusions. I had long noted that persons, brought into the hospital unconscious and operated upon immediately, had little or no nausea alteration of pulse, or other symptoms of shock; unless

the operation involved extensive abdominal exploration. Patients with fractures of the skull that needed trephining, crushed limbs needing amputation, broken bones requiring open operation, and wiring, surprised me, over and again, by their easy convalescence when operated upon within a few minutes after receiving an injury. This was especially true of cases operated upon while unconscious from cerebral concussion. Some of the concussion cases had severe headache for days, or even weeks, but no weakness, nor rapid pulse, nor symptoms of shock. Concussion of the brain may at times be confused with shock; but the two conditions are entirely distinct and different. The reason these cases had no shock, I now believe, is that the brain itself has no noci receptors and the operations were really anoci-association of operations. I would not recommend this method of preparing them, and yet, if a man were suddenly and unexpectedly knocked unconscious with a club, his sciatic and crural nerves blocked with cocaine, his hip might be amputated without the least shock. It would be a typical anoci-association operation. Even when patients are not unconscious, and when ether is used, I am sure they do much better if the operation is done within a few minutes after the injury than if they are allowed to wait an hour or a day expecting and dreading some terrible ordeal. The quick easy convalescence of emergency patients in general has forced itself upon my notice, and seems to me to be in strong contrast to the slower recovery, greater general discomfort, and greater shock, in cases carefully prepared for operation—though this depends to some extent unquestionably upon whether the patient resembles most the armadillo or the deer. The most brilliant results from anoci-association operations should be in women who most resemble, let us say, gazelles. Patients resembling skunks should have very little shock anyway from ordinary operations.

I have been struck also with the easy convalescence

following brain operations. Some years ago I reported to this society 28 operations for epilepsy, in most of which very extensive exploration of the cranial cavity and brain itself was made, and noted the recovery of all of them with remarkable freedom from shock, or even the ordinary malaise and discomfort usually following other operations. Since then I have repeatedly observed the same thing after even more daring operations for tumors or bullets in the brain. The explanation is furnished by Crile. The brain has no noci receptors, and these observations also tend to confirm that statement. In abdominal work shock, as we know, is comparatively great, and is in direct ratio to the time and extent of exposure and the rough handling of viscera. Crile has given us an excellent explanation of this in phylogenetic association. There is less chance here for blocking noci associations than in other regions, for both hereditary and anatomical reasons. The noci impulses are stronger and the afferent nerves unduly diffused. We may, however, avoid aggravating the condition by a prolonged series of suggestive preparations, and may do much good by keeping the patient in a proper frame of mind and by the injection of morphine and atropin before operating, and also by quick and delicate operating.

I feel sure that the next decade will bring a great advance in this direction, and that the causes of shock being so much better known, the remedy will follow.

At present, we should at least do as much as possible to prevent pre-operative noci suggestions. Where this has been done, either accidentally or by intention, I am sure I have noticed the diminution of shock. This is done for us by nature, in infants. And my own observation has been that infants have much less shock than adults, under similar conditions provided little blood is lost. It is hard to believe that hemorrhage is a direct cause of shock; but it certainly aggravates it, probably by causing a lack of material from which exhausted cells may refill, and a poorer

circulation to carry away mucous waste products from the cells. High forceps delivery is a splendid example of anoci-association operation. The infant knows no sense of danger. He has no noci receptors sufficiently developed to carry impulses to his brain, and none in his brain. Consequently, his brain may be mashed into grotesque shape, compressed, even lacerated, without a single impulse for defence or escape, and he arrives strong and vigorous and without the slightest shock. My colleague, Dr. Shands, who has had a large experience in operating upon young children, tells me that he, also, has been greatly impressed with the lack of shock following serious operations upon them, and also that many negroes and ignorant persons who have confidence in the doctor and no fear of the operation, either for that reason or because they cannot realize its serious nature, have little or no shock. All these things strongly tend to confirm the conclusion that Crile's observations have led to, namely, that fear, in some form, is the chief factor in producing shock, and that the impulses of fear, or dread, acting upon the brain cells, previous to operation, are often more potent than the subconscious associations and suggestions during the actual operating.

And this may occur even though outward evidence of fear be controlled by inhibition of the will. The idea of being "cut into" with a knife is especially abhorrent to many individuals, and the idea of having important viscera handled or removed is a real terror to many. I have had to assure some patients that I would not use a knife, substituting scissors, before they would consent to operation. The fear of pain is usually greater than the fear of death, and patients cannot conceive of large wounds without pain. They dread the pain they feel sure must follow operation, and if they do have postoperative pain, dread its continuance and increase.

The lesson is that we should give as little suggestive preparatory treatment as possible. Starving and excessive

purging and scrubbing are fortunately obsolete; but it is still common practice to leave a patient on the carriage in the anesthetizing room half an hour or more, waiting for the anesthetic to be started, often practically unattended and unoccupied, and free to develop noci associations at a tremendous rate. We should assure our patients that the average operation is about as safe as the average railway journey, and much safer than a trip on some roads.

That there will be no pain during the operation and little or none following it, and see that these promises are kept. The first is easily kept, and the second usually possible without risk or harm to the patient. In this way we may usually bring patients to operation in a cheerful and comparatively comfortable frame of mind, and a little extra care and time spent in this way will be well repaid. In grave operations upon patients of the rabbit or deer class, whenever possible, Crile's plan of anoci-association should be fully carried out. With more experience, and along these lines, I believe we shall be able to master shock, as we have mastered hemorrhage and infection, and that there will be few deaths following any operation, except those done upon really moribund patients in a forlorn attempt to prolong their lives.

Even more important than this will be the placing of surgery upon a more humane basis, and the saving of any immense amount of mental as well as physical suffering to many patients and for opening the way and giving us a long lead in this direction, surgery owes to Dr. Crile a great debt.

DISCUSSION ON THE PAPERS OF DRS. BARTLETT AND CARR

Dr. George W. Crile, of Cleveland.—Dr. Bartlett, it seems to me, has hit upon a graphic, original, and brilliant idea for testing in a way the vasomotor mechanism, and it is beyond criticism. To me it is a matter of the greatest possible comfort to feel that Dr. Bartlett has been able to confirm some of the deductions that my associates and I have made in the past. I shall look forward with a good deal of pleasure to seeing this paper in print. Like Dr. Carr did in his paper, Dr. Bartlett has presented this subject in beautiful form, and has put in more practical and scientific form the hypothesis I heretofore ventured to suggest. Dr. Carr has also presented the subject in concrete, practical form along precisely the same lines, so that I think we will make progress and confirm what he has said, namely, not only are we able to classify the mortality rate, but spare the patient the harshness of surgery itself, and it is along the line suggested that surgery ought to be done.

As to anesthesia, we find that if one uses local anesthesia—novocain—as well as general anesthesia, it is a tremendous advance, in that it not only makes the operation much safer but also relieves the patient of most of the postoperative neurasthenia, the embarrassment, and nervous strain at the time of convalescence in the hospital.

Dr. Southgate Leigh, of Norfolk, Virginia.—In the splendid work that has been and is being done by Dr. Crile in lessening shock and removing the disagreeable features of operations, there is probably no one factor which is more important and helpful than the use of nitrous oxide-oxygen anesthesia. It has been a surprise to me that this method of anesthesia has not become more generally used.

In the last three years my associate, Dr. Culpepper, and I have been experimenting with, and extending the use of nitrous oxide and oxygen, and we feel that in some respects the method which we have developed is superior to others, especially in two points. First, the entire absence of cyanosis, and, second, lessening of the cost.

We recently reported before the Virginia State Medical Society 700 cases in which we used in ordinary surgical work nitrous oxide and oxygen. We have not had the slightest

bad effect in any of them. I have heard many operators express the feeling that it was not a practical anesthetic because relaxation was not good. We have found no trouble at all in getting relaxation in all classes of cases. We have found no depression whatever. The patients go to sleep quietly in from one to four minutes. They regain consciousness in about the same length of time. There is no mucus in the throat or in the bronchial tubes. There is little or no nausea. The anesthetic is pleasant to take. There is rarely any fear on the part of the patient. The majority of people, knowing that nitrous oxide is the same as laughing gas, such as is used by dentists, have no fear in taking it. We have noted no bad effects whatever postoperative, especially none on the lungs or kidneys. Practically the only disadvantage is that it requires an expert to keep up the sensitive equilibrium of complete anesthesia. We feel from our experience that it is an ideal anesthetic, and will and must in a short time come into general use.

THE FARCE OF MEDICAL ETHICS

By Charles A. L. Reed, M.D.
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"The Farce of Medical Ethics" is the title of an article that appeared in *Pearson's Magazine* for September, 1911. The editorial note introducing the article says: "The doctors of this country are making a farce of the 'ethics' of their noble profession, about which they are so fond of talking. The family practitioner and the specialist are 'ethical' all right in their deals with one another. But the poor patient, who certainly is concerned in any matter of real ethics, is not considered at all. The thing is done in this way. The family practitioner decides that the services of a specialist are needed. He suggests the man. Then he gets a part of the specialist's fee as a commission. This practice has got to be universal."

That last word, "universal," is liable to be taken as meaning everybody, everywhere. Of course it was meant to imply "well distributed;" that is to say, that somebody but not everybody practically everywhere is addicted to the pernicious practice. But these distinctions are rather nice and I happen to know that the net result of the article on the popular mind was that of a sweeping indictment. As originally published, it went into every section of the country. It has been largely reproduced and extensively commented upon by the daily press. Through organizations inaugurated by selfish interests to break down the influence and prestige of the medical profession, the echo has been

carried into yet other channels. The consequence is that the people have been forced into an interrogative attitude.

Is it true that the confidence we repose in our honored family doctor is being used by him as a speculative commodity? Is it true that our trusted medical adviser is actually selling us to those who bid highest for the "trade?" Are we really being "steered" into the hands of those who, under the cloak of a sacred profession, are in fact but heartless adventurers? Is there the remotest possibility that, for such despicable gain, by such repugnant collusion, our bodies are being mutilated by needless operations at the hands of alleged surgeons known to be destitute of skill? Are the annals of secret murder being enriched by the multiplication of such tragedies? These are some of the questions that, as a result of the publication in question, must to-day be inevitably lodged in the minds of many thousands of the American people. And such questions must inevitably lead up to the other question, asked and featured in the article under consideration: "If some of these things happened to you, and you or yours suffered and died, would you not feel like shooting your family physician?" To this question, not alone for myself but for every honorable member of my profession, I answer with an emphatic "*Yes.*"

But denial is not sufficient. Nor is proclamation of virtue. It is precisely at such protestations that the sneer is directed. It is precisely to impeach such pretensions that the facts have been arrayed. And the facts must be looked squarely in the face. They must be dealt with as they are found. What are they? When the article under review appeared, honorable members of the profession, men clothed in the mantle of their conscious integrity, men who for years have honored me with their professional confidence and support, came to me and said:

"You must answer it: the allegations are libelous; they place us—you and us—in the attitude of suspects; we may no longer advise our friends where or to whom to go for council."

"A man is judged by the rectitude of his life," I answered, "and no man shall long be misjudged because others are scoundrels."

"But the honor of our profession is assailed, and it is unjust to itself if it permits the charge to go unrefuted."

I felt the same way. I addressed myself to the task. This means that I at once tried to find out for myself the exact facts in the case as it stands to-day. For it is one of the proudest distinctions of my professional life that no man has ever approached me with the offensive and dishonest proposal. So I wrote to my colleagues in every part of the country, and asked some of my neighbors. This is what I wrote:

1. To what extent is the practice of fee-splitting prevalent in your State?

2. What are the methods and what is the degree of rapacity of your particular type of grafters?

3. What has your local profession done, and what ought to be done in a more general way to drive the perpetrators of this vice from the profession?

The information came promptly. From Portland to Portland, from Duluth to Galveston, came the reply that the profession, as a profession, was not given to the practice; that it was everywhere held to be repugnant to every sense of professional honor; that, in many localities, it was unknown, but that, wherever known, it was and is held in abhorrence by the representative men of the profession. So much for the attitude of the medical profession, and so much for the unguarded or, rather, the overzealous utterance by which that profession, even in its microscopic parts, has been mounted under the high power, oil immersion lens of popular scrutiny.

But the charge goes farther. The whole range of ethics, as applied to and accepted by the medical profession, is being reduced to a farce—this and nothing less is the gravamen of the allegation. What does this imply? Simply

that physicians are becoming—it is not alleged that all of them have already become—hypocrites in professing to be governed by certain tenets representing certain specified applications of the Golden Rule. That is all that is implied by "ethics." What are some of these tenets? Here are a few:

A physician shall recognize his responsibility to his patient; govern the relationship with humanity, delicacy and privacy; be attentive; avoid unnecessary service; use the fullest knowledge in diagnosis; employ the best remedies in cure; select them without reference to school, pathy, form, force or kingdom of nature; be frank and wise in prognosis; give mental and moral support to the afflicted; minister to the necessities of incurables; lead a pure and temperate life; avoid self-exploitation; give his inventions to the welfare of humanity; recognize his own limitations; seek counsel from the specially learned; search out new truths; formulate new laws; give of his services freely to the poor; and, above all, teach the public anything and everything that will prevent disease, lengthen life, promote efficiency and thus add to the sum total of human happiness. This is the mission of the physician as he has set it down for himself. These, in brief, are the Principles of Ethics adopted by the American Medical Association for the government of all who would call themselves regular physicians. Have these tenets all been negatived, and has the integrity of the great medical profession been thereby impeached—utterly impeached—because in one particular a few have been recreant to their trust? Have their derelictions sapped the foundations, crumbled the pillars, or destroyed the keystone, and is the temple, therefore, already falling into a shapeless mass? Let the answer come, not from the priesthood of Æsculapius, but from them to whom that priesthood has ministered and is today ministering.

And now that I have in a measure placed the medical profession right, I feel that by the same stroke I have shown

why the editor in question ought to do justice to the 140,000 physicians of the United States by removing an impression that, I feel, it was not his intention to establish in the public mind. This point adjusted, let me say in the very next breath, that every one of that same 140,000 physicians owes a debt of deepest gratitude to that same editor and to the author of the article for having brought an insidious, sneaking, skulking, growing evil into the withering, blistering sunlight of publicity. By that act, both of them have somewhat tardily come to second the almost equally tardy efforts of the medical profession to clean its own ranks. Some ten years ago the American Medical Association adopted the Principles of Ethics, which contain a positive declaration against fee-splitting. The proviso contained no penal clause. The enactment of such a clause was left to each of the 2010 affiliated county societies, many of which have taken the necessary steps. The Erie County (N. Y.) Medical Society almost ten years ago took decisive action, going even to the extent of recommending open publicity as the one efficient action. As a result of this attitude by local medical societies persons guilty of the practice have, in more than one instance, had the brand of professional ostracism burned deeply into their brows. Dr. John B. Murphy, President of the American Medical Association, at the meeting of that organization in Los Angeles last June, recommended drastic action by the central body. That action is now in process of formulation. So, after all, the medical profession has not been entirely derelict in sweeping the rubbish out of its own house. But it has not generally appealed, as it might better have appealed, to the public for coöperation. There was, as there is yet, doubt in certain quarters of the profession as to the existence of the evil. Some that long since knew of it felt that the poison with which it was laden must soon be its undoing. They shrank from giving it publicity, much as one shrinks from heralding the fact that a member of one's own family

is a thief or a bandit. Then, too, there is an old adage about the causal relationship of stirred filth to disseminated stench. In this way—clearly a mistaken although a human and natural way—less has been said and done in the open than might have been done. But a sporadic outbreak of indignation now and then served to show that the slumbering profession had begun to snarl and was about ready to bite. This final prod from the press has brought us precisely to the biting point, and we are really much obliged to the prodder. And here are some morsels, hard as files, upon which to whet our teeth.

From Chicago comes the statement that the practice of fee-splitting prevails "to a very great and appalling extent —so great that I blush for the medical profession in admitting it."

From Minnesota comes the unwelcome message: "I regret that the practice of giving commissions, that is of selling patients, is rather widespread throughout the country."

From Louisville: "The practice has come to be very general throughout the country—although the profession, by which I mean the great majority of its members, neither practice nor countenance it."

From New York comes a comforting assurance: "It is my impression," says my correspondent, "that on the whole the leaders of the profession have such high standards that fee-splitting is practically unknown among them, although the Jewish doctors of the East Side are addicted to the practice and openly defend it."

From New Orleans comes the reassuring statement that the practice has no footing, although its occasional perpetration is far from being unknown.

From San Francisco comes the gloomy report that the practice is prevalent among the lower classes of the profession, with now and then a man of higher degree who succumbs to its venal powers of seduction.

Scores of similar replies could be quoted. The practice cannot be denied. It must be admitted. Only, it is not the practice, it is not the vice of the profession, but of a minority of its members. But they are too numerous; and what is worse, they are members, and while they are permitted to remain members, the majority thus permitting them must shoulder the full share of responsibility for their offenses. The day has come when these offenders must be made to stand out, each by himself, known and pointed to as a pariah by the community to which he sustains a parasitic relation.

And this is a question of first concern to that same community, to all communities, to the people. For who may not fall ill? And, being ill, need a physician? And, needing a physician, need counsel, need some specialized service? Then it is that one turns to one's physician, and, in the most sacred confidence, says: "Doctor, get whom you wish, only get the best, the very best. You know them; I don't. But my wife, brave little woman, must be saved—for the children's sake, for my sake!"

Thus you trusted him, your family physician, and justly in most instances. But now and then, it seems, one of them may exist whose mental processes run in this channel: "Ah, now I have them! Let me see:—Brown *is* the best, but no use talking—he is so straight he leans back. Everybody knows Smith is good, but he turned down a case I sent him—said it didn't need operation; and, besides, he won't pay anything! But there's Tattersham: not much of a surgeon; wanted to operate for cancer and for appendicitis when there wasn't either; the patients wouldn't stand for it; both got well without operation. He'll do it—and divide the fee, too!" So the patient, in the abundance of her faith, is carried to Tattersham—and dies! But the physician goes back with a part of Tattersham's fee made larger to meet the physician's demand, concealed about his person as a reward for his perfidy. Betrayed, robbed,

bereaved, the husband and father goes to his home of desolation, comforted only with his "faithful adviser's" assurance: "I took you to the best man in the whole country the result just couldn't have been helped; but, say, wasn't he reasonable in his charges?"

Shall not the people take counsel among themselves? Shall not they and honorable physicians counsel together? Shall they not study physicians, trusting the trustworthy, but protecting themselves against the other class? Is it not the duty of the people, in their own behalf, to coöperate with the great, beneficent, altruistic, medical profession in an effort to rid its own ranks of elements that are inimical to its very existence?

But we have started out to look the facts squarely in face. What are some of the methods of some of these pirates? And who are they? It is revealed by my investigations that, while surgeons are the bright and shining marks for this species of piracy, consultants in other departments, ophthalmologists, neurologists, laryngologists, and general medical consultants—internists—are being levied upon by this unbridled rapacity.

It seems, furthermore, that while the initiative is generally taken by family attendants, overtures and open bids are occasionally made for the "business" by representatives of all classes of consultants. It is merely the young and the necessitous who make up the buyers and sellers in this traffic. The well-established, the well-to-do are often the effective traders. They are of that class that come to the consultant with a case in which dangerous, and possibly fatal, complications have developed through delay.

"Doctor, I've been trying to get this patient to come to you for six months, but he simply wouldn't do it till now," is what the medical attendant says, half apologetically, after he has asked to see the consultant privately.

"Doctor, I've been insisting that this ought to be done for a year, but my doctor wouldn't hear to it till I just took

the matter into my own hands, and even then he tried to make me go to somebody else that nobody ever heard of"—is what the same patient, in a burst of indignation, tells you the very next day.

This particular type differs, at least in point of frankness, from another, a representative of which replied to me:

"Why didn't I bring her in sooner? Do you think I didn't want to make anything out of the case myself?"

He was a prosperous man, trusted by the community, trusted by this particular patient. He said it half jocularly—as if the life of a trusting patient were a joking matter. But, joke or no joke, the facts so fit his jest that it ceased to be a jest. He had no occasion to demand *his* graft; he had "earned" it in advance.

Or, on the other hand, the honest medical attendant is shocked after a consultation, to be handed a check, or a roll, or to be told that he will "be taken care of." In some cases recourse is had to the "assistant" ruse, by which the medical attendant, who realizes that he is not a surgeon, is made ostensibly, if not really, to figure as an assistant at an operation, simply as a basis for splitting the fee. This is not only dishonesty in dollars and cents, but it is hypocrisy with the possible addition of manslaughter—quiet, insidious, unspoken-of manslaughter, but manslaughter just the same. The joint bill, with no items given, is another device by which the money of the patient is quietly and dishonestly transferred from his own pocket to the pockets of the men who at that very moment and by that very act are speculating upon his infirmities. The fact is that this joint-bill trick is but a clumsy makeshift, not for honesty, but for honest appearance; one that is being employed by certain consultants, otherwise respectable, who, while loudly condemning fee-splitting, are thus endeavoring to avail themselves of what they imagine to be its usufruct. If the items are given, so that the patient may know just how much is going to whom and for what,

there is no occasion for a joint bill. Any joint bill that does not enable the patient to know precisely these facts is *prima facie* evidence of a fraudulent transaction, and the people ought to be instructed so to understand it.

A distinguished surgeon tells of a medical man who brought him a patient several hundred miles. She was presumed to have cancer, and was naturally scared nearly to death by the diagnosis. She came ready to submit to the most dreadful of all operations. The surgeon examined her carefully. He told her that she had no cancer; that she needed no operation. A little later, her medical "adviser"—Heaven save the mark!—appeared upon the scene. "What!" he exclaimed, "you didn't tell her, did you? I had her all fixed for an operation! What! Not going to operate? Why, you must! Why, great God, man, she's got money! money!—lots of it!" I can procure an affidavit that this was an actual occurrence. It is needless to say that it was not long before this particular buccaneer found a healthier atmosphere outside that surgeon's office.

A favorite trick of the local medical broker is to take the entire business arrangement, so far as the consultant is concerned, into his own hands. The consultant's fee, plus the grafter's fee, is then quoted to the patient, the sum total being represented as the consultant's fee. This method is less objectionable to the consultant, as he thereby gets his fee, but it is equally dishonest to the patient, and tends to bring the consultant into disrepute for making excessive charges. Men who are dishonest enough to instigate this sort of an arrangement have been known to be dishonest enough to keep the entire fee thus collected, leaving the confiding consultant to whistle for his pay.

A distinguished member of the profession—none other than Dr. John B. Murphy, of Chicago—whose misfortune it is to live in a city in which this evil is notoriously rife, classifies the consultants who buy their business by fee-splitting as follows, viz.:

"1. Those who openly admit to the medical man that they will pay a large portion of the fee."

"2. Those who take the referring doctor into the side room, or alley, and divide the fee with him."

"3. Those who permit the family doctor to collect the fee and pay him what portion he desires."

"4. Those who send the doctor who referred the case a check representing a considerable portion of the fee."

There is another kind of practice which, if not fee-splitting, is at least profit-sharing and, therefore, equivalent in its disastrous effects upon society. I allude to the private proprietary hospital. Many an honest man has been, and some are still, being forced by circumstances to maintain these institutions. They are least objectionable when they are individual enterprises, and they are defensible only when they are the only means of affording accommodations for patients.

But many of them, I am informed, are stock companies, with the stock quietly but judiciously placed in the hands of men best calculated to be "feeders." These are not all surgical institutions; sanatoria for the nervous, for the insane —sometimes the alleged insane—great dietetic reformatories, and similar institutions fall within the category. These conditions and these professional relationships must be looked into by the people. The public will demand, if I mistake not, that any professional man, to stand best, must be without proprietary or other extraneous interests, the profits from which are even incidentally contingent upon his professional advice. The medical profession denies, flatly denies, fellowship to the poor devil who owns a drug store, and does it on the ground that he has an unholy contingent interest in the paltry prescriptions that he may write. Consistency demands the application of the same principle to these proprietors and stockholders whose contingent interest in a given patient is often a thousandfold more than the possible profits on a single prescription.

All of this shows that the evil is upon us. What does it mean to the people? What to the medical profession itself? What are its causes? What are the influences that it is alleged are thus threatening, insidiously, but surely, to subvert the common honesty of our profession, and that are to-day forcing us to defend its dignity and its very honor at the bar of public opinion? For let no man, however distinguished a member of the medical profession, envelop himself in his conscious superiority and imagine that he eats such meat that he, too, is not impaled upon the shaft of popular suspicion.

The fundamental cause of this evil will probably be found in the fallibility of human nature. Something in a more positive sense may be set down against the apparently all-pervading spirit of graft. The atmosphere, contaminated by "Big Business" through the noisome centres of politics, has obtunded and enervated the moral sensibilities of the body social. We see it from the servant who does our marketing and the railroad officer who gets his on the side, to the banker who peculates the savings of the widow and the orphan. Lawyers of high repute tell me that the legal profession is honeycombed by the fee-splitting vice. This is revolting enough—this thing of selling our legal rights, selling justice itself, but it is infinitely less revolting than clandestine commerce with human life as its commodity.

Authors on criminology, statisticians, tell us that society in general has normally a certain proportion of moral defectives. The nearly 140,000 persons who comprise the medical profession cannot but have their fair proportion of this class. But, in addition to these, the evidence would seem to indicate that we have more than our normal proportion. Such special consequences point to special causes.

Here are some of them:

Our per capita supply of physicians, one to every 650 persons, is from three to six times greater than in England, France, Germany or Italy. But this is not all. By the action

of this same overcrowded profession in teaching the people how to keep well there is twenty-five per cent. less work to do. Modern surgery is curing a lot of cases that were formerly permanent investments yielding regular dividends to the medical profession. This has taken away nearly another twenty-five per cent., making in all something like fifty per cent. from the physician's income—all within the last two and a half decades. Then, too, relatively to the compensation exacted in other callings, relatively to the economic not to mention the humane value of services rendered, and relatively to the high cost of living, the medical profession is to-day shockingly underpaid. So there is a bread and butter reason why some doctors try to "gather gear" by some wiles not justified by honor. The parsimony of the public toward the medical profession is in large part responsible for this state of affairs. In the particular relation under consideration, these conditions generally become operative through both parties to the transaction. The medical attendant makes the diagnosis, assumes the responsibility of selecting the consultant, and expends time and money in going to the conference. This is extraordinary service that calls for extraordinary compensation. Every medical attendant should demand such extraordinary compensation; but too often he is a coward and fails to do so. If he does, it too often happens that claim is not allowed by the penurious patient. Then, in the absence of high ethical conceptions on both sides, the buying and selling begins—with the patient getting the short end of it. The people, who are vastly more interested in this question than the medical profession can possibly be, thus declining to pay their just debts for honest service, are now awakening to the fact that, in increasing numbers, they are being quietly sold to offset their parsimony.

Then, too, in medical teaching there is too often a tendency to what I prefer to call vulgarization of highly specialized subjects. They are taken up by, or rather presented

to, students who have not had sufficient preliminary study. This is true of diseases of the eye, ear, nose, throat, abdomen, and pelvis, as well as general surgery. Operations are too often done flippantly to show classes how easily the wonderful operator can do them, rather than to exemplify with what care and detail they should be done. Tyros are thus emboldened to jump into special work without preliminary general experience, intellectually a combination of squint cross-eyes, and myopia. No special apprenticeship is required, no special training for special work. So, having no actual qualifications to attract patronage, they have recourse to corrupt collusion. Many of our hospital clinics and some of our institutions for post-graduate work are responsible for the multiplication of half-baked, but thoroughly commercialized, pseudo-specialists. The complete dearth of formal ethical teaching, enforced or voluntary, in our medical curricula is, to my mind, another potent cause of the alleged "farce of medical ethics." I am old-fashioned enough to believe in the mission of the church. Unless religion is taught, the religious sentiment will wane; unless mortality is taught, moral standards will decline, and unless ethical principles are taught, ethical practices will cease to obtain. It has been revealed that in certain instances these money changers—these misery merchants—have been discovered within university faculties arranging with outgoing students for "business on a commission basis," thus corrupting and defiling the tide of the profession at its very fountain head. The last two decades have witnessed the multiplication of scientific subjects, especially practical subjects—dollar-and-cent subjects—to the almost complete exclusion of subjects relating to the welfare of the medical profession as a whole, and to its relation as a social group to all other social groups. Thus the body of the profession has been fed, but its soul has been starved.

These, then, are the facts. What shall we do about them? First, let us thank the press for what it has done and is

doing and invoke its further coöperation. Publicity—open, frank, eager publicity—is the one great, remedial agency. Tell the people about the ways and wiles by which they become commodities in this game of barter. Tell them that the first thing for them to do is to recognize the worth of their medical attendants, and give them extraordinary compensation for extraordinary services.

And what shall the people themselves do? A formula is impossible. Not all cases of even the same disease can be cured by the same remedy. Each has peculiarities that must be met. But the people can do much. They can think, compare notes, and discuss the question not only among themselves but with their doctors. Both ideas and ideals may be compared with mutual advantage. The people can and should inquire for themselves about the antecedents, qualifications, and reputation of proposed consultants. In the matter of reputations do not discriminate against the young man because he is young and because his reputation may be small. Small reputations may be good and the young man often represents not only the attained progress, but the developed efficiency of the profession. But what about his apprenticeship? Has it been adequate? You are entitled to the facts and there is not the slightest indelicacy in asking for them whoever the consultant may be. Ask the consultant himself; then, if satisfactory, do business with him. If ever you are convinced that you have been victimized by a brokerage deal—by a fee-splitting compact—openly and fearlessly denounce both parties to this transaction. Both are equally culpable. Report them and the facts to your county medical society, whether they are members of it or not. Do this and you can then safely "let nature take its course." One exposé of that kind will put an end to the business. Don't be afraid.

Then, too, the work of housecleaning already begun by the medical profession must be kept up. In the first place this is an individual proposition with every physician in the land.

Consultants, alive to existing conditions, should, when desired, lend their kind offices in seeing that the medical attendant is compensated—compensated openly by the patient who receives the service. Consultants may with propriety protect, but never with honesty bribe, the medical attendant who calls them. I have gone to the extent of declining to accept cases unless the just claims of medical attendants were recognized. Each county medical society must recognize that the Principles of Ethics of the American Medical Association are in effect a part of its organic law. It must now, to meet this condition, formally reaffirm Article VI, Section 4, which reads: "It is derogatory to professional character for physicians to pay, or offer to pay, commissions to any person whomsoever, who may recommend to them patients requiring general or special treatment or surgical operations. It is equally derogatory to professional character for physicians to solicit or to receive such commissions." Then adopt a penal clause to the effect that any person convicted of this offence before the Board of Censors shall be expelled from membership—just as has been done at Buffalo, Kansas City, New York, and Cincinnati. Then assuming that everybody will stand by the regulation, let the society issue a challenge in the shape of a substantial reward, payable to any individual or detective agency, for evidence that will thereafter convict any member of the offence. In the event of conviction, let the action be given the widest publicity, that the people may know and avoid at least one abuser of their confidence. The American Medical Association ought to require, and at its meeting next June probably will require, such action on the part of county societies as a condition of their continued affiliation with the national organization. In the meantime the people have a right to expect that their respective county medical societies will take prompt action without waiting for the lash from above. And, if I am not mistaken, most county medical societies will be keenly and for a time quietly

watched by their respective communities. The county newspapers ought and doubtless will take a hand in the watching State licensing boards, acting under statutes embracing the "gross immortality" clause, should enforce it against these culprits by revoking their license to practice. Notice to this effect should be issued without delay. In States where existing statutes are insufficient, amendatory legislation should be procured making fee-splitting a special offence. Illinois has made the acceptance by chauffeurs of commissions for automobile supplies a penal offence. The people are entitled to protection against crooked physicians quite as much as against crooked chauffeurs. Universities, seats of medical learning, should take a firm stand—like the University of Indiana, which has dropped one or more from its medical faculty for this cause. Let medical ethics be restored to its place in the educational curriculum. The question of the hour is that of ethical quickening, ethical regeneration, not alone in the medical profession, but in other professions and in society in general. This, with respect to the problem in hand, can be effected through organizations such as the Medical Civics Association of Cincinnati, made up of medical men and laymen, men and women. Its object is to consider all medical activities of a civic character: A national department of health, food, and drug legislation, antituberculosis campaign, milk commissions, medical inspection of schools, scientific research, medical education, social science, and, above all, the ethical relations of the medical profession and society to each other.

DISCUSSION

Dr. Henry O. Marcy, of Boston.—This is a subject of too great importance for us to allow it to go without discussion. While I agree with many of the things Dr. Reed has said and has written about, if the paper he has presented is to be made a popular presentation of the subject to the public, there should be a free discussion.

I have been a specialist in Boston for more than thirty years, and during that whole period not a single member of the profession has indirectly hinted that I should divide a fee with him. I do not believe the practice is at all common, although a superficial reader of the article that Dr. Reed has presented to us would infer that it was not only a heinous but common crime, a burning shame, and we should immediately take some steps toward its correction. I myself believe that it is a very rare offence, and I am quite sure that many of the gentlemen present will agree with me.

Dr. Robert S. Hill, of Montgomery, Ala.—I regret very much I cannot agree with Dr. Marcy. The practice according to my notion is not only common but is on the increase. They not only in many instances want to split the fee, but they sometimes take all of it. Now, gentlemen, we find these sort of men in every vocation not excepting the ministry. But we may just as well meet the evil as we find it in our profession. I do not believe the majority of surgeons are guilty of this practice, nor do I charge the majority of physicians with being guilty of it, but I do say there are surgeons with some reputations who, according to common report, are guilty of this practice, and I fear very much unless some positive stand is taken against the evil we will find it very much worse in the next five or ten years. The physician who comes with the patient to the surgeon is entitled to compensation, but he should present his bill directly to the patient or else the bill should be made out in the names of both the physician and surgeon. In this way the patient will know where his money has gone. This is fair and honest. The trouble is physicians do not fully appreciate and do not properly recognize that they have a just and legitimate claim and therefore undertake, at times, to secure through questionable and unfair methods compensation which they not only stand in need of, but have every right to claim and secure by fair and legitimate methods.

Dr. Walter B. Dorsett, of St. Louis.—I do not live in the Holy Land. The worm is not only attacking the surface, but it is gnawing rapidly to the core. I am one who has been approached, and more times than one, and I will relate one instance that occurred in my practice.

A gentleman, or supposed to be, living in a certain community, came to me with a patient, introduced the patient to me, and asked me to make an examination. I did so and found a large

bleeding fibroid. I went into the wash room. He followed me there, and said, "What is to be done to this patient?" I replied, "Nothing, doctor, but a hysterectomy." "What are you going to charge this patient for the operation?" "That depends upon the patient's circumstances." "Well," he said, "her husband owns a grocery store; he has a little farm." I said, "Will $175 be too much?" He replied, "You make it $225, and give me my fee of $50; you take $175." I said, "Doctor, I will not do that, but I will see that you get your fee." We went into the room where the patient was and she asked what had to be done. I told her. She was much distressed, and so was her husband. The husband said to me, "Doctor, I cannot pay a large fee; what are you going to charge me?" I said, "In the first place, you must pay your doctor for the time he is away from home and out of his office. You pay your doctor $50, and then you pay me $175." He said to his physician, "John, what is the matter with you? Here is your money." We went into the hall, and that physician said, "You have done me up with that family." I said, "Why?" "Because," he said, "she is my wife's sister." I said, "I am not a collecting agency. You have gotten your money; I will operate on the patient. Do you treat the members of this family?" "Yes." "Do you buy your groceries from this man?" "Yes." "Do you pay for them?" "Certainly, I do." "Do you get your money for treating his children when they have whooping cough, measles, etc.?" "No; I never charge my sister-in-law."

It is evident that in many instances the country doctor has not the nerve to charge his patients. He has not the nerve to ask.

I live in a community in which there is a man who sends out circular letters all over the country; that is, he sends these letters not only to doctors throughout the State of Missouri, but Illinois and other States, offering to divide the fee with any doctor who will send him or bring him a patient. In some instances he will give 40 per cent., in others 60 per cent. This man was a member of our State Medical Association when I had the honor of being president. He requested a place on the program. His name was placed on the program, but down near the end. Unfortunately several members who were on the program did not appear to read their papers, and by resolution nearly the last one on the program was moved near the centre of the program, and this man read his paper on the subject of fee-splitting. He instanced a case in which a doctor

brought a patient to a surgeon in the city, the surgeon collected a five hundred dollar fee, and the country doctor got a good cigar. In reading his paper he told of the hardships of the country doctor traveliing through the snow and sleet and said he felt sorry for the country doctor.

One of the members of the profession from Kansas City said he did not wish to speak to the paper, but some time ago a patient was brought to him, by a country doctor in Kansas, who had a fibroid tumor, and he asked for a consultation. He said, "Doctor, will you do this operation for $75?" The doctor replied, "Yes, I will do it for that if the patient cannot pay more." He did the operation for that amount; the patient recovered and went home. A short time afterward another woman came to him from the same section of the country; she had identically the same condition. The doctor told her what had to be done. She said, "I have perfect confidence in you as a surgeon, but there is only one thing that deters me from having an operation." "What is that, madam." "My inability to pay you your fee." He replied, "I have not quoted you a fee. I do not know how much to charge you." The woman said, "You charged my neighbor, Mrs. So-and-So $500." The doctor said, "I am sorry for the country doctor." He collected $425, and the man who did the operation only received $75 for his services.

This practice, gentlemen, is not an uncommon thing in my section of the country. It is a common thing. I know of doctors who I have refused to have anything to do with, who have approached me to find out where I stood, and I know where their patients are going now.

Dr. Charles H. Mayo, of Rochester, Minnesota.—Dr. Reed has given us a very interesting paper. A couple of years ago in talking with one of the members of the United States Senate I said that I had always felt the Senate to be one of the most representative bodies, containing the highest type of men in this country, but the general report of the work turned out by the United States Senate showed that when a senator reached home, instead of being called strictly honorable, he had to put in half of his time showing that he really was honest.

I was glad to hear what Dr. Marcy had to say about Boston, but I am afraid that the flagellating germ will work itself up that way if we do not look out.

President Matas has made a most graphic presentation of the

difference between the medical man of the present and the medical man of the past. In the old days of the practice of medicine the practitioner was a man of common sense, and good judgment, though he knew nothing of the problems presented to us to-day. The practice of medicine to-day is a matter of study. The practitioner does not have time to hold the hands of his patients by the hour, as was the case many years ago when this was a part of his duty. He had to get the family history, and to help them run their affairs. He had to do all sorts of service. Things said to him in confidence were not to be repeated. Patients expected his help, and he was called in more frequently than the minister. When we compare the past with the present we see what an enormous change has come to the medical profession.

It is fortunate that Dr. Murphy, as president of the American Medical Association, spoke of this evil of fee-splitting and giving commissions and put the Association on record before the matter was taken up by some of the lay journals. I am glad to know, however, that a very large majority of the profession do not indulge in this practice. Bob Ingersoll said a good thing when he remarked, that if he had a chance to run things he would make health catching; and while 95 per cent. of the medical profession are honest, the other 5 per cent. are insinuating themselves like the little flagellating germs we saw to-night in the motion pictures presented by President Matas, and the question is, What are we to do as a profession? We cannot ignore this evil. It does exist. We have it in our State, but I do not think it is as prevalent in Minnesota as it is in the adjoining States. The evil is growing, and the medical profession must take a positive and unmistakable stand in this matter, and where is this stand to come from? First, it must come from the colleges, not ordinary colleges, but from the State Universities.

Last year this subject was discussed in the North Dakota Legislature, and a bill went through (fortunately it was vetoed by the Governor) to this effect, that a surgeon in order to perform an operation had to give notice to the clerk of the court of his county, notifying two physicians who were to examine the patient and see if the operation was necessary, and whether, in their judgment, it was best to do the operation. Not only that, but whatever was removed from the patient was to be kept on record by the clerk of the court for future reference They feared unnecessary operation which fee-splitting leads to

We have ignored this question of fee-splitting so long that the public is going to handle it for us. They are already looking upon us very much as they look upon the members of the United States Senate.

We must tell our universities that they have a duty to perform, namely, that of teaching young men honesty, and that any man, professor or teacher, belonging to any university must quickly get out if he resorts to such a practice. This point was brought up last year at a meeting of the colleges to the effect that if a single member of the staff of any college was doing this sort of thing the whole college was to be dropped from the association of colleges of this country.

REMARKS UPON THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE BILIARY TRACT WITH SPECIAL REFERENCE TO THE DIFFICULTIES AND DANGERS

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In considering subjects like that of this paper, the surgeon must often wonder, as I do now, in what direction his experience is leading him, whether the right or the wrong, whether, as in the case of the tariff, he is revising his opinions upward or revising them downward; whether in fact his views vary in such a way that, having published them years ago, when his experience was limited, it is not his duty to publish them again, now that his experience has greatly increased.

In answering these questions, it seems to me, due to him, as well as to his readers, to express to them any changes that his ideas, founded upon renewed experience, may have undergone—whether of diagnosis, prognosis, indications for operation, or technique. And this seems to me specially true of a subject like that of biliary tract diseases, in which, as I have elsewhere shown, the combinations of pathological conditions are almost infinite. Although it is true that, on the average, the simple, easily diagnosticated and easily remedied combination will be the one first encountered, for that combination is the most common, the beginner may meet with the most complex, obscure, and hard-to-remedy one in the well-nigh endless list.

Since my last paper was published under a title similar to that of the present paper ("The Difficulties and Dangers of Operations upon the Biliary Tract," *Old Dominion Journal*, August, 1908) I have seen many unusual and extraordinary examples of the possible wide variety of gall-bladder lesions. I have encountered many new difficulties, and have been at my wits' ends to meet them successfully. Some of my previous views have been strengthened and some weakened; some I have abandoned altogether. The one view which experience strengthens is that no field of abdominal surgery presents greater difficulties, and none, on the whole, permits greater successes.

A friend, writing recently from Schenectady, asked me to explain, if I could, the great discrepancies in the results of operations for gallstones at the different clinics of the world. He was surprised to find a mortality of 8.2 per cent. in one clinic and 2 per cent. in another; in still others, a small mortality. My reply to this, and to similar questions concerning results, is that we do not have the same class of cases; and that we are not talking therefore of the same things. We cannot compare deductions unless the data are alike—methods and skill in biliary surgery cannot be fairly judged by results alone, unless lesion and patient are practically the same. The mortality depends upon the lesion as well as upon the way in which it is met. Indeed, it depends more upon the lesion. The mortality, for instance, will be vastly greater in certain lesions, with great skill, than in certain other lesions, treated with indifferent skill. For a just estimate of the result in certain lesions, those lesions must be practically the same, in patients of the same type; the same mode of life; of similar strength, resistance, endurance, and the like; and the skill applied to them must be practically the same.

Results, immediate and remote, vary somewhat according to the surgeon's skill and experience; but they do not vary to such a degree as may be inferred from statistics like the

above, for, taking surgeons as a body, under the same general condition, their results will, I believe, average about the same, excluding those of a few men who are obviously unskilful. There will be a certain percentage in favor of skill and experience, but that percentage will be much smaller than we might expect. The difference must be sought for elsewhere.

When, therefore, we wish to ascertain the prognosis in certain operative lesions, we must take the average of the large clinics, where the average of skill and experience is presumably high. Even then we do not account for the variation in results mentioned by my Schenectady friend unless we consider, as I have done, the similarity or dissimilarity in the class of cases operated upon. Take hysterectomy for cancer, for example. When I see 57 per cent. of permanent recoveries in cancer in the reported cases of one man; 25 per cent. in those of another; 10 per cent., 5 per cent., or even 2 per cent. in those of others, I know that there is some reason for the discrepancy not accounted for by the skill, or by the methods of the men who published the results. Uterine cancer, as we encounter it, does not permit, in the nature of things, any such variation in results. The only explanation possible is that one operator takes only the most favorable cases, while another gives his patient every chance, even if it is but one in a thousand. We who count our cases of uterine cancer, operable and inoperable, by hundreds, cannot but throw out as utterly worthless for all practical considerations percentages of permanent cures so much in excess of the average of the great operators of the world. And so it is with other lesions. The mortality varies more in accordance with an operator's radicalism in advising operation, than in his skill in performing that operation. Not that skill and thoroughness are not productive of better results than want of skill and thoroughness; but they do not account for the difference in permanent cure ranging between 2 per cent. and 57 per

cent., between 25 per cent. and 57 per cent., or 2 per cent. and 25 per cent.

As for the mortality, all operators of large experience can select their cases so that there will be practically no mortality whatever. Can I not select my cases of biliary tract lesions so that there will be after operation no deaths, few deaths, or many deaths? I most assuredly can. But all conscientious operators are willing to give their patients a chance, even if that chance is small; and between different men there is a difference in the weight to be given that small chance.

I do not mean to say anything more than that in advising operations the surgeons of one clinic are highly conservative; those of another highly radical; in one clinic a chance of one in a thousand may be given to an eager patient, while in another, if the chances are no better than one in fifty, one in twenty-five, or one in ten, or even one in two, medical treatment may be preferred. Could we meet at the bedside, examine the patient, hear the indications voiced, see the operation performed, watch the after-treatment—then and then only could we get the real prognosis of gall-bladder surgery. Until that time we must confine to our prognosis, on the whole, the adjective "brilliant," but varying chiefly according to the lesion and not to the operator's skill.

Then, again, statistics are often tabulated by rules or by exceptions or by both, so that for one reason or another bad results are totally eliminated. I know that the results in the Massachusetts General Hospital and in the Boston City Hospital, are to be depended upon as absolutely impartial, for the reason that the statistics are made up by disinterested persons.

At the Massachusetts General I know that they are accurate as well as impartial, for I am there and cannot be deceived, even were there any desire for deception. In using the word *deception* in connection with statistics, I do not mean to imply that there is deception practised in

the reports of any clinic. I do wish to express as strong an opinion as I can that we are not dealing with data that are alike, or even similar when we draw conclusions widely differing.

In both the City Hospital and the Massachusetts General, in which the skill and experience of the operators are high, high mortalities are wholly dependent upon the class of patients treated and the desperate nature of their cases.

The truth of this statement is shown by the widely different rate of mortality after operations upon the different surgical diseases of the same organ—of the appendix, for example. At the Massachusetts General Hospital, in removal of the non-infected appendix for conditions described as interval in which the operation is throughout aseptic, there have been in the last five years, 264 operations with no deaths, no mortality whatever; in cases described as chronic there have been 625 operations with two deaths; in subacute cases, 528 operations with one death, a mortality of 0.3 per cent. and 0.2 per cent. respectively; in acute appendicitis, 1084 operations with 24 deaths, a mortality of 2.2 per cent.; in acute appendicitis with diffuse peritonitis there have been 145 operations with 50 deaths, a mortality of 40 per cent.

The absence of mortality in the one class of cases, and its excessive rate in another, is owing to the absence of sepsis and its diffusion respectively. Although in the bad cases, technique and speed may make some little difference, it does not account for a large mortality, in some hospitals an excessive one, and in others, a small one. I do not believe, for example, that in diffuse general peritonitis methods make much difference, for I myself see the same results under all methods and in the hands of all surgeons: the results depend rather upon the nature of the case than upon the surgeon or his methods. I would welcome in my wards any advocate of a method with which he cures certain lesions in everybody, and I would show him cases of that disease

such as I have never yet seen cured by anybody. In a word, it is a matter of description, and of the use of words, especially of adjectives. I have no doubt, as I have said many times before, that at the bedside and at the operating table our prognoses would be about the same, and their truth would be proved by the result after operation.

A recent case illustrates the dependence of mortality upon lesion. An apparently acute appendicitis came to the Massachusetts General Hospital wards and was diagnosticated and operated upon as appendicitis by myself. The appendix was not gangrenous, but there was a general peritonitis. Further search showed a gangrenous Meckel's diverticulum, which was removed. The patient died of the general peritonitis, which was already far advanced. I do not mean to say that the diverticulum was any worse than the appendix would have been, as a cause of general peritonitis, but it was the far advanced stage of the diffused peritonitis that killed, and not this or that method of after-treatment.

Practising in a large city where the worst conditions prevail, and where removal to the hospital of even the most serious cases is usually practicable, I find that my mortality is higher than that in certain other communities where, from the nature of things, but few desperate cases can be expected to develop.

I do not mean to say that in a hundred or a thousand cases, results do not vary under circumstances as nearly alike as they can well be, the greater success being the legitimate proof of greater skill and experience on the part of the operator; but, taking cases by the thousand, the level of success will be about the same throughout the world.

When, therefore, there is a variation greater than can be accounted for by a reasonable consideration of all the elements of success or failure, I am obliged to conclude that at one place a very different weight is given to some

indication for operation from that in another. For example at a clinic which I had consented to give away from home there was sent me, among other inoperable cases (as I regarded them), a patient of about fifty, with a stone impacted in the common duct, complicated with pneumonia—and double pneumonia at that! I advised against operation, of course. At another operative clinic that I had been invited to give, they brought me a man past middle life, with umbilical and double inguinal hernia, for radical cure. He had at the time a violent *delirium tremens* from chronic alcoholism, and it seemed to me about as inoperable a case as I had ever seen. I advised against operation, and declined to operate. The surgeon of the clinic had the courage of his convictions, and operated himself, with recovery of the patient.

It is evident to me that the results in the radical cure of hernia in this clinic cannot compare, should not compare, with those of a man who (in my opinion, very properly) advises the radical cure of hernia only when everything, including age, is favorable.

So in gall-bladder surgery I can affirm, from my own results and experience, that deaths and failures will result in practically no cases in which there are no contraindication and in which the operations are limited to favorable conditions. Whereas if every case is operated upon that presents any hope whatever of cure, but which without operation has no hope, the results, even in the hands of the best, will be very different. Bad cases in good hands cannot compare in operative prognosis with good cases even in bad hands. The mortality in the former is high beyond the powers of the very best; in the latter it is beneath the power of harm of the most inexperienced, provided he knows enough to perform an aseptic operation.

In estimating operative dangers, I do not regard statistics then of much account, except in the general way. Comparing, for example, the great mortality of certain major

operations with the trivial mortality of some of the minor ones, we can fairly conclude that one is a dangerous and the other a safe procedure.

In the surgery of the biliary tract my results, like those of all operators of large experience, have been, on the whole, gratifying, and I look back on my work with the greatest satisfaction. The first real difficulty in gallstone surgery is the diagnosis; the first avoidable danger, the ill-considered and mistaken diagnosis.

Error is common enough in the experience of those painstaking diagnosticians whose success is little less than instinct. Disaster following even such an error cannot but cause in the conscientious surgeon self-reproach and a mighty resolve to do better in the future. Disaster based upon error in diagnosis, easily avoidable, causes, as indeed it should, a self-condemnation and regret that can never be forgotten. It should never be forgotten, but should ever remain a bar to haste and inadequate study.

If I have repeated this statement in lecture, clinic, and upon every appropriate occasion I have but followed Oliver Wendell Holmes' advice to teachers, that ideas can be impressed only by iteration and reiteration; and yet by iteration and reiteration we fail, I think, to make a deep impression upon the practitioners of surgery. We repeat *ad nauseam* the warnings of experience. The same evil results follow failure to heed the lesson. Experience, as Franklin says, does indeed keep a dear school. The operator especially needs this warning, for it should make no difference to him with what diagnosis the patient comes. The diagnosis upon which the surgeon operates should be his own, subjected to his own analysis and confirmation, *no matter who makes it.* He must be careful even when the diagnosis has been made by one skilful and experienced, and especially must he beware of taking it upon hearsay. A hearsay opinion blindly followed has led to many an unjustifiable operation. There may have been an error of transmission,

a total misunderstanding even; moreover, the responsibility for surgical operations is the surgeon's, just as the rewards are his, and he is not justified in following the advice of any man, no matter how eminent, unless he approves of that advice.

I do not mean to say that the surgeon should not give proper weight to the opinion of others, but his acts must be the result of his own observations and experience. Otherwise he may become but the blind follower of another, too often a blind follower of the blind.

I repeat here again what I know to be true, that the surgeon cannot fail in the long run to acquire the highest possible skill in diagnosis, for he sees the connection between cause and effect. Is it not his task to demonstrate those perhaps obscure abnormalities upon which depend slight variations in the history and physical signs?

Indeed, we do not know as yet the possibilities of human skill in diagnosis, especially in the less frequently explored areas of the body. Dr. Harvey Cushing's skill in recognizing and locating brain lesions seems to me little less than marvellous; but does it not show still more wonderful possibilities in the future of all fields of human pathology?

Time and space do not permit me to go into a detailed discussion of the diagnosis of gallstones. I wish to call attention rather to the frequency of error and to the necessity for careful study. If we can eliminate haste and carelessness in the formulations of the indications for and against operation, we shall eliminate, I am fully convinced, the chief causes of unnecessary and therefore unjustifiable operations, and that worst of disasters, death or disability following the unnecessary or unjustifiable operation.

Not that care will ever prevent wrong diagnoses. It will not; but it will take away the sting of error, the chief source of remorse to the conscientious surgeon, to the conscience responsive to self-admitted negligence.

We may divide gallstone diagnoses into two chief groups,

the plain and the obscure. The first group comprises cases so plain that few if any errors are possible. Into the second group we may put the cases difficult of recognition, cases so obscure that diagnosis is almost a matter of intuition. There are few if any cases of gallstone disease which do not come under one group or the other. There seems to me no middle class, neither easy nor hard of determination.

In the first group are patients with pain in the epigastrium radiating to the back or down the right side, controlled only by powerful narcotics, ending suddenly or by degrees; with tenderness and often a perceptible gall-bladder; with perceptible if brief jaundice, or if not jaundice, an excess of bile in the urine; with gallstones in the stools and a history of similar attacks. Pain with any of these symptoms puts the patient in the first class.

The second class includes all cases not in the first, all cases in which there is pain of some sort, from an agony to a distress, but without any confirmatory physical signs.

Now it is evident that one can become skilful in the second group only by seeing with his own eyes the demonstration of the right upper quadrant of the abdomen in connection with the history and diagnosis. After a few hundred such cases the surgeon becomes really skilful in interpreting histories. In most cases he will succeed in interpreting them with confidence and correctly, but he will find himself not infrequently mistaken in a positive opinion. The less positive the diagnosis the more frequently will the surgeon find no gallstones.

Now is it not clear that to become really accurate in the diagnosis of the lesions of the upper abdomen, and especially of the right upper quadrant of the abdomen, the observer must be not only familiar with the history and the physical signs, but he must see with his own eyes the exact pathological condition upon the living patient? And is it not also evident that just as the surgeon learns most from his operation, and the physician most from his preliminary study

of the patient, so will the diagnostician become really great who makes his own diagnosis from the preliminary history of the case, and confirms or disproves it by a painstaking operation.

If the surgeon at different intervals finds himself more and more convinced, with each repetition of the history, of the truth of his diagnosis, he may be quite sure of gallstones, especially if repeated cross-examination of his patient fails to introduce any real weakness in the history.

The reliability of his diagnosis will vary with the strength of his impressions, it will be, perhaps, as I say, intuitive or instinctive, rather than scientifically deductive. I have been impressed by the accuracy of deduction in these second group cases, and I should say that there were more errors when the case was apparently plain than when it was obscure. The plain case means too often a hasty diagnosis; the obscure, a painstaking one. The plane of accuracy cannot but be higher in the carefully studied difficult case than in the briefly considered plain one—prolonged consideration versus the offhand guess cannot but come out ahead in the long run.

The discussion of the diagnosis of gallstones would be incomplete without some reference to its errors and their occasional far-reaching results. The recent paper of Dr. Brewer, of New York, before the Congress of North American Surgeons, set the profession a good example of professional candor which it would be well for us all to follow. Diseases of the biliary tract from diagnosis to establish convalescence are attended by the responsibilities of human fallibility of the highest order. These remarks are copiously illustrated from the memory of my own cases, without a glance at my records, where lie forgotten many others. Here, where these words are written, in a far-off camp on Cape Cod, an illustrative example arises. The local physician, a friend of large practice, asks me about the case of a strong healthy man with right-sided uneasiness and discomfort who

underwent an operation for gallstones. The surgeon, in my opinion, second to none that I have ever known, found "adhesions about the gall-bladder." Separation of these adhesions was followed by death on the third day. I do not happen myself to have had in my own experience an illustrative case of death following exploration for supposed gallstones, in which none were found. I have been spared that responsibility, but it is one of the possibilities of wrong diagnosis and unnecessary operation.

There are many possibilities under the diagnosis of cholelithiasis, the most common of which is the entire absence of gallstones. In most such cases, when the diagnosis has been positive, I have found an adequate cause for pain, as it seemed to me, in the condition of the bile which made its flow slow and painful, as it was thick and tenacious. Drainage for two or three weeks has always proved permanently curative. In such cases the lesion is real and quite as disabling as gallstones would have been. In some cases, as Moynihan has observed, the mucous membrane of the gall-bladder is studded with minute crystalline incrustations, presumably the beginnings of gallstones.

In not a few instances, instead of gallstones or other affections of the biliary tract, I have found other organic lesions near the biliary field—notably, gastric, duodenal colic, or even rectal. Sometimes one finds an absurd explanation for the pain in a *herpes zoster*. The diagnosis has been at times the strongest possible, lacking only the discovery of a stone in the feces. I once found a perforation of gastric ulcer in the patient of a very expert internist who congratulated himself that up to that time he had never made a mistake in the diagnosis of gallstones.

One sometimes finds gallstones in the gall-bladders of patients whose symptoms are owing to some vastly worse lesion, as in the following remarkable case:

Miss T., aged forty-two years, consulted me on May 3, 1906, for frequent attacks of nausea and vomiting, followed,

she said, by a great deal of soreness around the gall-bladder and in the liver. The diagnosis of gallstones was made, and the patient was operated on at the Corey Hill Hospital on May 7, 1906. The gall-bladder was aspirated and about one ounce of black, thick bile was removed. One rough black stone about the size of a pea was removed from the gall-bladder. The symptoms were not relieved by this operation, and an exploration on June 18, 1906, showed cancer of the jejunum, for which a lateral anastomosis was performed. The patient made a good recovery from this operation, but later the symptoms recurred and examination on February 14, 1907, showed a large lobulated tumor filling the lower abdomen. Bimanually it gave the impression of multiple fibroids, except that a mass down behind the uterus, on the left, had a "doughy" feeling. At operation a left ovarian cyst was found, semisolid, lobulated, and very adherent to the uterus, evidently malignant. On the right was a similar ovarian growth, but smaller. These were both removed. The most frequent cause of error in advanced jaundice, supposed to be due to impacted gallstones, is cancer of the head of the pancreas.

If we do our full duty in cases of painless jaundice in which the very painlessness suggests strongly a malignant pancreas, we shall make a few errors of diagnosis, but the errors will be of that beneficent form that will result in the restoration of health. I have seen so many of these, compared with the total number of cases, that, in view of their absolute hopelessness if let alone, whether they be cancer or impacted gallstones, the few recoveries please me more than all others, for these patients were as good as resurrected from the grave.

These cases were not all supposed to be pancreatic cancer, but cancer of indefinite situation somewhere along the biliary tract. In one instance, often quoted, I found and removed a hypernephroma thus diagnosticated by Janeway, but by me as a gall-bladder.

I could give many instances of diagnostic error, some leading to an operation in which little was accomplished but biliary drainage, as I have described, some to lesions not even suspected, but practically all to conditions in which my measures were brilliantly successful.

The real indications for exploration of the biliary tract are those of some organic lesion demanding, as the best or the only chance of cure, mechanical or surgical relief. If the surgeon finds conditions other than those he has predicted, but which themselves require relief perhaps even more strongly than gallstones, his indications are fulfilled. If he finds nothing to justify his operation, the fact of normal anatomy is in itself a certain satisfaction and, in the case of suspected malignancy, an ample reward. Not that the surgeon can help a certain chagrin, but that chagrin seems to me amply made up for if he can thereby remove from his patient and his patient's friends the awful cloud of cancer. And we all know that in many cases actual visual and tactile demonstration of the exact truth is the only thing that will disperse that cloud.

But in spite of these examples of brilliant results following errors of exact diagnosis, we must not forget that the tendency of the times is, unfortunately, toward the indiscriminate application of surgery to diagnosis made by those incompetent to make them, or to act upon them if they are correct. Hence the warnings that, it seems to me, are needed in gatherings of representative men, both physicians and surgeons.

With reference to operation, it follows that in the absence of contra-indications the cases of the first group mentioned demand operation, those of the second justify it. The chief things are to give the diagnosis painstaking consideration, and to admit, in advising operation, the possibility of a fruitless effort.

The surgeon should not, of course, regard himself or his reputation in the least if there comes up a question involving

vitally the patient. But he should, for his own peace of mind, in every case make the fullest possible investigation, emphasizing the contra-indications rather than the indications for operation. And the emphasis to be laid upon contra-indications is important because operation at best is a confession of failure to cure by medical and non-operative measures. Not that operative measures are not simplest and safest in many lesions, and the only means in most mechanical diseases, but we must all admit that, were the goal of our profession reached, surgical operations would be rendered unnecessary and would be replaced by medical treatment, or perhaps medical treatment itself would be rendered unnecessary by preventive measures. But at present, in our ignorance and fallibility, we must satisfy our conscience and protect our patient by the greatest possible care in advising surgical operations.

The selection of methods, whether cholecystostomy, cholecystectomy, cystic-duct or common-duct operations, is a most important matter, as influencing and being influenced by the outcome. My first observation of years ago, which after all is but common sense, that the deeper the more difficult and prolonged the operation, the greater the mortality, holds good. The safest of all operations, though not always the most effective, is simple cholecystostomy; the most dangerous, that upon the hepatic and common ducts.

I do not, of course, consider a choice between these methods when no choice is admissible, as shown by the manual examination of the biliary tract, but only the cases in which a complete cure is possible by different operations of differing mortality.

To determine, then, what must or what may be done, the first thing to consider is the pathology. In a general way that operation will be most dangerous to life which is the most difficult and prolonged; but it does not follow that the safest operation will be the most satisfactory in the end,

or that it will be good judgment to select the safest because of its safety. For example, the safest operation is simple drainage of the gall-bladder; but in many cases this operation will not remove the cause; it will necessarily be followed by biliary fistula, or other disadvantages, whenever the gall-stone is situated in the cystic or common duct, and will not even relieve jaundice when the stone is in the hepatic. It means practically an overlooked stone in such cases. But, other things being equal, that operation is, when possible, to be selected which combines the greatest safety with the greatest efficiency. This part of my subject is best introduced by a consideration of the digital or manual diagnosis.

No operation on the biliary tract should be undertaken without the most thorough palpation with the whole hand in the abdominal cavity. The surgeon must know where the stones are, and where they are not.

The place where if stones are overlooked the operation is a failure or worse than a failure (a menace to life and health without doing the least good to the original condition) is the common or the hepatic duct. When overlooked, they necessarily cause persistent trouble, although the operation in the main is beneficial or life-saving. If overlooked in the gall-bladder their continued presence may never be suspected, though they may cause many renewed symptoms.

I know of no more difficult explorations than these, nor of any more disturbing reflections than follow unsuccessful operations based upon them. I cite as an example a patient of middle age who died of hemorrhage after a simple cholecystostomy based upon the digital detection of a small nodule in the head of the pancreas, and diagnosticated by myself as cancer. I was sure that this small tumor was cancer, and not a gallstone buried in the head of the pancreas, but I knew well the fallibility of human opinion in general and mine in particular. The man died of an uncontrollable ooze of blood. It was the greatest possible

comfort to know by autopsy that my opinion was right, and it was a comfort to the family to know that we had given the only possible relief to jaundice, and an even greater comfort that a painless death removed the possibility of prolonged sufferings and of despair to a formerly vigorous and athletic man unused to sickness and to disability.

To make the digital exploration of real reliability, the brain behind the finger must be experienced in the study and detection of pathological conditions during life. I will not take the time to relate cases in which I was wrong, or cases in which a correct deduction meant life and health to the patient: I will simply say that no man's conscience should permit him to enter upon the field of biliary surgey unless during the exploration he can recognize beyond reasonable doubt, and by the sense of touch alone, the pathology of the biliary tract, more especially that part situated in the depths of the abdomen.

Every man has on the cadaver, if nowhere else, abundant opportunity to make himself familiar with the normal, and that is more than half the battle. If he has the opportunity to study also the pathology of this tract, as he will in far too many medical autopsies, all the better.

The *prognosis* in the surgery of this great field is influenced for good or for bad according to the promptness of diagnosis. After all is said or done for this or that incision, for this or that operation, for this or that method of after-treatment, the chief thing, and by far the most important thing, besides which everything else sinks into insignificance, and these remarks apply to almost all fields of abdominal surgery, especially that of infections and obstructions, with or without malignant disease, the chief thing and the all-important thing is, I repeat, the promptest possible recognition of the cause. The skill of operative technique is no more to be compared in importance with timeliness of intervention than cure is to be compared with prevention. Indeed, promptness is the first and greatest element in the

prevention of grave complications and in the promotion of safe operation. In a word, timeliness means ease and safety; delay means difficulty and disaster.

So much comes to my mind as I write concerning the diagnosis of diseases of the biliary tract that it is hard for me to make my remarks brief.

In the diagnosis of surgical diseases and especially of those in which the evidence of the senses is important, let it never be forgotten that nothing ever has taken or ever will take the place of the education of the senses. And he will be the great diagnostician who with skill at deduction, combines skill in the interpretation of what he sees, hears, touches, and smells. Of all these none compares with the *tactus eruditus*. And it is no excuse that opportunities for the education of the senses are few, for even if examples of disease are infrequent, examples of health are always at one's disposal. It is indeed a hard case when the prospective abdominal surgeon cannot get a normal abdomen to examine, or at autopsy a normal biliary tract to explore.

I cannot help at times, much as I value new and experimental methods of investigating disease, and as much as I try them provided they are not painful and do no harm, I cannot help, I say, feeling that some of us rely too much on new-fangled short-cuts to diagnosis, neglecting the old-fashioned, well-tried methods of the past, detailed histories and painstaking physical examinations.

I have recently had sent me from the tropics an "obscure" abdominal tumor, in which doubt of the diagnosis existed after a year's observation. The patient had had I don't know how many of the refined experiments of the modern laboratory. One in particular, a method of which, I was ashamed to admit to the patient, I had never heard, had eliminated tuberculosis. Had any of the physicians taken the trouble to put his finger up the unfortunate man's rectum the diagnosis would have been clear a year ago, for I found the pelvis a solid mass of malignant disease obstruct-

ing the rectum and compressing the bladder. Have I not found in the practice of one man three cases in which his treatment of the stomach and duodenum had proved ineffective, and to the solution of which every refinement of medical chemistry and modern therapeutics had been applied, but in which rectal examinations had never been made, until I found in all the patients, hopeless cancer easily within reach of the finger?

I must admit a feeling of, what shall I say, impatience at least, when I see prevail so many badly proved methods of diagnosis, short cuts, so to speak, replacing the good old finger tips, "so many trick plays and so little straight foot-ball," to use a modern expression, so little "bucking the line," as it were.

The failure to recognize a serious lesion and one that by early operation can be safely and permanently cured has not as yet acquired in the medical profession or in the community the name of disaster, but does it not mean disaster, disability, hopelessness, and death? In some diseases, like cancer in operable localities, such failure means deprivation of the only hope of cure, small though it be: in biliary tract lesions it means in most cases disability and untimely death. As contrasted with operative errors or complications it is an error of omission not often recognized or placed at its true value. The error moreover takes perhaps months and years to become plain, by which time the responsibility for it is lost.

If we seek to place where it belongs the real responsibility for the evil results of gallstones, we must seek the shoulders of those who, for one reason or another, have failed to recognize the disease; or, if they have recognized it, have failed to realize the importance of operation in the early stages of that disease. The surgeon is obliged to take not only the responsibilities of the operation itself, but the blame for bad results directly dependent upon delayed operation and the increased risks of delayed operation; for if disaster

follows operation the layman looks upon it as the result of that operation, and does not appreciate the increased dangers of delay.

We must be alert then, wide-awake and skilful, if we are to prevent the occurrence directly or indirectly of disasters and dangers due to errors of diagnosis and to lateness of surgical intervention.

But I must repeat, the diagnosis of gallstones is by no means always easy; sometimes it is impossible. In all cases, in which there is no confirmatory physical sign, the surgeon who operates upon his own or anybody's diagnosis, without being fully prepared to find nothing, has a greater confidence in the possibilities of human skill than I, for one, have.

I have learned to place much weight upon the opinion of the family physician. Certain men of this much-overworked, much-criticised, and ill-rewarded class, I have found correct in their diagnoses so many times that I now hesitate long before I say that they are wrong and I am right. I have just removed a single stone from its impaction in the beginning of the cystic duct. There it had lain probably for many years, and from the impaction the gall-bladder had become much enlarged and thickened, with its mucous membrane covered with minute incrustations of lime. I was so uncertain of the diagnosis that I more than half expected to find nothing. But sure enough Dr. Adams (of Rockland, Maine) was right: he had sized up the patient and made his deductions from the history alone, and he had advised operation. The credit is entirely his!

One object of the present address is to caution would-be operators upon the biliary tract against dangers to be encountered, not by any means to frighten them from this most attractive field, but rather to stimulate them to adequate preparation. It is sometimes said that surgeons, already in the field, wish to maintain a monopoly of that field. Perhaps some do; but there is more surgery that ought to be done, and that is not done, than we have any

idea of. If you take a broad practice in the hands of some men you will find large numbers of imperative surgical cases, cases that demand for their cure or benefit, surgical treatment, indeed, that cannot prosper without it. In the next town perhaps there will be a similar practice without any operative surgery whatever. Now, think what we may of surgery, however we may advise our patients, as educated men we know that hundreds of diseases are becoming fatal without operation. Hundreds are better treated surgically than medically, though many may survive under palliation.

Of course, we admit, and none know this better than the operating surgeons, that much of the present-day surgery is unnecessary or worse than useless. But why condemn the splendors of surgery because a few ignorant and zealous men overdo it?

One danger, common to all abdominal operations, *general peritonitis*, is, in my experience, the least of all encountered in biliary tract surgery. I have had but one case. If the ordinary precautions are taken, the operator need have little fear of this disaster. The reason for this lies in the isolation of the right upper quadrant from the rest of the abdominal cavity, by the ascending and the transverse colon, with their mesenteries. This anatomical arrangement of the large intestine, with that of the stomach and duodenum, makes an effective barrier against the spreading of most right upper quadrant infections. It would confine them all, I think, excepting those in which the amount of septic fluid is very large.

Another reason for the comparative rarity of general peritonitis in biliary tract lesions and operations is the mildness of the infecting microörganisms.

The one great, and in most cases unavoidable, danger in gall-bladder surgery is hemorrhage.

Hemorrhage is to me, and probably to most surgeons, the most dreadful postoperative possibility, no matter what the operation or the lesion. It is the most distressing

and hard to bear when the hemorrhage is from a slight operation, especially that performed for a discomfort or other trivial cause, a tonsillectomy, for example, in a child, a repaired cervix in an adult, a bad tooth in a bleeder.

When a patient bleeds because of some mechanical defect in the operation, as when a ligature slips, or the hemostasis has not been effective, when, for example, a spurting vessel has been overlooked, or the general ooze continues, which has been intrusted to the pressure of a gauze packing or a cigarette drain, when, in a word, the surgeon has closed the abdomen with some oozing still going on, which he hopes and believes will stop of itself, but which does not stop (surgeons vary exceedingly in their faith), under these circumstances a fatal hemorrhage is indeed hard for a conscientious surgeon to contemplate.

Not that hemorrhage is not an ever-present danger never to be forgotten in even the simplest of operations, but it is vastly more to be feared in the surgery of the biliary tract than in any other part of the body.

And it is not, I am inclined to fear, because jaundice is a cause of bleeding, but because some of the operations require dissection in which bleeding is hard to control, or when controlled, easy to start up and hard to check a second time.

The one thing that characterizes gall-bladder hemorrhage is its unexpectedness. This is because we do not quite understand its causes. The bleeding peculiar to the biliary tract is that which comes in jaundice. This form of hemorrhage, for which in jaundice we must ever be prepared, is the most formidable and really dreadful thing I have ever met with in operative surgery. What makes it so hard to contemplate is one's utter helplessness in trying to check it. I have seen much of hemorrhage in jaundice, and I have learned to dread its first appearance as an almost invariably fatal sign.

The ordinary hemorrhage comes from the slipping of a

ligature, or the starting up of an ooze controlled perfectly at operation but later beginning again. The hemorrhage of jaundice may start from a wound in which at the time of operation there was no bleeding whatsoever and in which no ligatures whatever were necessary. It is an uncontrollable ooze. Every capillary seems to contribute its mite to the general escape. As fast as one point is tied, another starts up. I have seen not only the results of this form of bleeding after operation, but I have had it occur before my eyes while in the midst of operating. I recall one instance in which it was necessary to apply ligature after ligature in a wound that had not bled at all at first, but in which as fast as one bleeding point was tied another appeared. At the *post-mortems* of these almost invariably fatal cases the oozing has been found to involve most extensively not only the cut surfaces, but all neighboring tissues. In one instance the parietal peritoneum was raised in great blebs.

But the most discouraging thing about hemorrhage in biliary tract surgery, it has seemed to me, is its unexpectedness in non-jaundiced patients. Hemorrhage in jaundiced patients is to be especially feared, but not in every case. When one is fearful of the accident, it does not seem to occur; when one feels perhaps quite confident that nothing will happen, then it seems to happen. And it is not because confidence breeds carelessness, for we are careful in every case. One cannot relax his vigilance under any circumstances without increasing his patient's danger. A too short blood coagulation time shows that bleeding is likely to occur. I do not think that there is much use in treatment to hasten the coagulation time. We now never try it.

The physician's interest in gallstone diseases is naturally greater than the surgeon's, for he cannot but encounter a larger number of cases. It is, I think, the common experience in general practice to meet with biliary and renal colic. Many such diagnoses are made, whether correctly or not, and the common result, most of my audience know, is

speedy recovery. And after so fortunate an experience the physician naturally concludes that many operations are unnecessary, or at least that the surgeon at once rushes into operation for conditions that on the chances will remedy themselves.

In contrast with this too favorable prognosis in gallstone diseases comes the surgeon, who sees the other side. And he gets, does he not, as unfavorable an impression as the physician does favorable?

I, myself, engaged all the time in gallstone surgery, am too much inclined to think that the majority of cases have been unjustifiably allowed to drift into conditions either hopeless or extremely difficult to remedy, for I see the most difficult and complicated of these lesions, some of which demand operation as the only possible condition of cure, while others are already beyond the possibility of alleviation by any means of treatment.

I see the safety, ease, and success of early operations; the danger, difficulty, and failure of late operations. In trying to show the advantages of the former, I am confronted by the fact, which I well know, that many patients recover spontaneously, or are never troubled after one or two attacks. I am told, as doubtless many of you will tell me, what I well know and admit, that all symptoms may quickly and permanently subside.

But, on the other hand, I tell the physician that once gallstones have been positively demonstrated, either by being found in the stools, or by histories of repeated attacks that are characteristic there is no real safety for the patient until they are removed, and that they are removed the most safely and successfully when they are confined in a comparatively healthy gall-bladder.

Now, I repeat in this paper what I have published in others, the remark of a physician when he heard of the death of his patient of hemorrhage after operation by me for impacted gallstones with deep jaundice: "I shall never

forgive myself for letting her be operated upon." The responsibility of her death was as surely on his shoulders as the credit of a good if unsuccessful attempt to relieve a hopeless lesion was upon mine. We gave the patient the only chance of life that the physician's ignorance and procrastination had left her.

I have tried for many years to express in some emphatic and persuasive way my conviction that for real downright difficulties and dangers the surgery of the biliary tract presents more serious problems than any other tract of the body that is frequently explored.

In many branches of surgery I have been and am able to illustrate all these things from my own experience. It may be that I have learned enough from that experience to avoid in recent years the errors from which in times past my patients have had to suffer, for I have but few new illustrations to draw from. Furthermore, I exhausted some time ago my old stock. I am obliged therefore to give up my original plan, that of confining my criticisms to my own acts, and, for want of any illustrative errors of my own, to bring in a few for which others are responsible. My chief object, let it be remembered, is to make this field, so far as I can, a safe one, both as to diagnosis and as to treatment.

Two patients have recently been brought to my notice after operations by other surgeons. In both occurred errors or complications which illustrate well my subject. I should never have heard of the second, except that the patient supposed that I had operated upon her. I had not, I was glad to assure her second surgeon, having responsibilities enough of my own.

This patient was operated upon in June, 1909, by a surgeon of large experience and rare skill, for whom I have the strongest personal and professional regard. The records of this case state that, upon the diagnosis of gallstones, the biliary tract was exposed by an incision along the rectus large enough to admit the hand. A few stones were found

in an unchanged gall-bladder. A stone was then found impacted in the common duct. It could not be dislodged, and was removed by choledochotomy. A large probe was passed into the common duct to the duodenum, and upward into the liver. The duct was then closed with silk and the gall-bladder drained. The patient made a quick recovery.

In November, 1911, the patient consulted a physician for the same pain for which she had been operated upon before. She went to the hospital where she had been operated upon and they told her that she was hysterical. There was no jaundice or other sign of gallstones except tenderness in the gall-bladder region. The physician's diagnosis was gallstones and operation was advised. At operation by another surgeon a shrunken and adherent gall-bladder was found to contain "six faceted gallstones the size of a pea; a much dilated common duct with a pocket containing a dozen faceted gallstones ranging in size from a hazel-nut to a small pea." Three pea-sized stones, which were supposed to come from the hepatic duct, were taken out. The gall-bladder was removed and the common duct opened.

This instance seems to me of great interest chiefly because gallstones were overlooked when all the requirements for escaping this error had been fulfilled, namely, an incision admitting the hand, and, on the part of the operating surgeon, large experience in gall-bladder surgery and unusual operative skill. Could new stones form and become faceted in the short time between the two operations? I do not believe they could.

In cases like this is error unavoidable?

I have seen the whole operation of cholecystotomy and choledochotomy go for nothing, and worse than nothing, on account of my failure to remove a single stone dislodged in the opening of the common duct, and lost beyond recovery in the depths of the liver.

The best illustration of this great disaster in my experience was that of a man of middle age in whose common duct

I found a medium-sized gallstone tightly impacted near the pancreas. The small of the back had been elevated by a large pad to bring up as much as possible the depths of the operative field. Before opening the common duct I tried to dislodge the stone, and, for convenience of incision, bring it up nearer the cystic duct. The proximal portion of the common duct and the hepatic duct itself were so dilated that the stone gravitated into the depths of the great fissure of the liver, from which I could not get it out though I tried a long time to do so. There was the unfortunate patient who had undergone a grave operation, in which all that I had accomplished was the shifting of the stone from the pancreatic portion of the biliary stream to the hepatic. Had the man lived the stone would doubtless have drifted back in the biliary stream into its old impaction. Nothing whatever was accomplished, and the man died.

This case illustrates how a stone may disappear into the great fissure of the liver far beyond palpation, and where it will escape detection. A stone was known to have retreated into the duct because I felt it go, if I did not push it unintentionally out of reach. How are we to escape overlooking stones that were lost high up in the duct before operation? I feel most carefully in every case as high up as the thumb and finger will go. When the common duct is opened, I probe, with a large blunt instrument; finally I wash out the ducts, the hepatic and common, with a small soft catheter.

As the above case shows this may not bring down the stone. May it defeat instead of promote dislodgement?

The only objection I have seen to this procedure is the possibility of pushing a stone up farther and into more effective impaction. That may be possible, but from the success I have had with this method it is more likely, I think, to dislodge and wash downward the stone. When there are several stones—and I have seen as many as 150—the stream of water cannot help dislodging and

bringing back some of them at least. In every case of choledochotomy the small rubber catheter should be used, one with the ordinary lateral eye, one with the terminal opening, and a third with a backward stream.

The question of renewed, possibly of recurrent, lesions of the biliary tract has not perhaps received the attention that it deserves. That symptoms occur like those that made the original operation necessary is unquestionable. The first thought is that new gallstones have formed; the second, that a stone remained undiscovered and overlooked at the original operation.

That stones should re-form in the gall-bladder is, I suppose, not without probability; but cholecystotomy with drainage leaves the gall-bladder in a state of health free from all bacterial *niduses*. Since my first operation on the gall-bladder, in 1886 or thereabouts, I have never seen, so far as I can recollect, a single case of recurring stones, of stones formed when once the gall-bladder had been thoroughly drained.

Symptoms of biliary colic are not unusual subsequent to cholecystotomy. I have learned to expect them in a certain percentage of cases. They occur not many months after the operation, and then subside for good. I have thought that these attacks might be owing to a fragment of old stone, a plug of mucus, or something of that kind.

In one or two instances I have demonstrated in the stools after an attack of postoperative colic a fragment of old gallstone. That these attacks are not owing to freshly formed stones, their subsidence and non-recurrence seem to show. It is unheard of in my experience to open a gall-bladder that has once been drained and to find gallstones of recent formation, *i. e.*, gallstones that are soft and bright colored. On the other hand it is not at all uncommon for me to remove a stone overlooked at the original operation, especially when that operation was performed by a man of small experience.

It is quite a different matter when symptoms recur after removal of the gall-bladder. It is quite possible that attacks of pain like the pain of biliary colic may be caused by a gallstone overlooked, or a fragment broken and left at the original cholecystectomy; but these attacks are much less likely to occur after removal of the gall-bladder than after simple drainage.

It is just as unlikely that a new gallstone should form after removal of the gall-bladder as that one should form in the bile ducts in the first place. It is possible, but improbable. Hence pain, fever, and jaundice after extirpation of the gall-bladder, with or without choledochotomy, are more likely to depend upon an infection of these passages, a cholangitis, than upon an overlooked or re-formed stone.

And if such an explanation is, perforce, the most likely one after cholecystectomy, why is it not likely also after simple gall-bladder drainage? It is not so likely, of course, because there is a gall-bladder and cystic duct with its possible contribution to the pathology.

I admit that recurrence of gallstone symptoms, after removal of the gall-bladder, is a distressing and disquieting experience. While it is possible again to explore the common duct, the possibilities of remediable mechanical lesions are much less than when there is remaining a gall-bladder and cystic duct.

That the surgeon is not at the end of his resources, when after a reasonable delay symptoms of biliary obstruction persist, the following case shows. This case encourages the surgeon to persist in his attempts at relief, even when everything in the outlook seems discouraging.

A gentleman, aged fifty-two years, a patient of Dr. Jenckes, of Woonsocket, R. I., seen first November 15, 1902, began in 1900 to have what was called "bilious attacks," with pain and vomiting followed by jaundice. These attacks recurred at long intervals, and were the result of what he called indiscretions in diet. The food, he said, did not get

into the intestines, but stayed in the stomach and caused distress. He could eat no solid food whatever. No blood was ever seen in the vomitus. The stomach had been washed out twice, but no evidence of gastric disease was found. The morning of my first examination a severe attack came on and lasted until the patient took ½ grain of morphine. There had been a loss of fifteen pounds in weight. The diagnosis rested entirely upon the history; for, beyond tenderness in the epigastrium, there was nothing by physical examination.

November 24, 1902, I found a thickened gall-bladder contracted upon a single gallstone. The pancreas was nodular and hard, thickened and cartilaginous. With great difficulty a tube was fastened into the gall-bladder. No other stones could be felt. This patient made a good recovery and remained well until March of the following year, when he began to have attacks of pain in the epigastrium, with vomiting. The pain required morphine. There had been a gain in weight since the operation in November. The pain in the epigastrium and in the centre of the operation wound. By April 9 the patient was distinctly jaundiced.

These attacks continued until January, 1904, with recurring jaundice and attacks of pain. The weight went down from 170 to 154. A mass could be felt deep in the epigastrium. The case now seemed to me more like malignancy than like gallstones. I advised exploration, though my diagnosis was cancer of the pancreas. The "acute indigestions" with jaundice still continued, with loss of weight, and, in February, 1905, I explored through the scar. An extensive mass of adhesions was found between the scar, the transverse colon, and duodenum. After separating the adhesions, pulling down the transverse colon, and partly freeing the outside of the duodenum, I could feel a hard mass at the head of the pancreas. The induration seemed to extend up the common duct. There were several enlarged glands about the duodenum.

In consideration of the probably cancerous nature of the tumor, the difficulty of the operation, and the desire on the part of the patient not to have a drained wound, the operation was abandoned at this point, and the wound was closed. The patient made a good recovery, was told the facts, and went home.

He was very well until the next winter. His stomach was then in a peculiar state. The tongue was heavily coated all the time. Jaundice came on every three to six weeks, and then disappeared entirely. In August, 1905, he began, with the attacks of jaundice, to have chills, with a temperature that ran sometimes to 103°. The stomach at times seemed perfectly well for several months at a time, with occasional grumbling pains. February 5, 1908, the patient was jaundiced, and the stools were white. There had been a gain in weight, which was 162. There was a hernia in the scar.

It seemed to me that the history indicated positively that the symptoms were due to a stone and not to cancer, and that my second operation had led to mistaken inferences from the anatomical appearances during life. I therefore operated a third time at Corey Hill Hospital on February 12, 1908.

The dissection was rendered difficult by the great extent of the scar tissue and by the many adhesions. The remains of the gall-bladder were exposed, with the common duct so dilated as to seem a part of the gall-bladder. One large stone and several smaller ones could be felt in the common duct, which was dilated to the diameter of an inch. The duct was incised longitudinally and two large, kidney-shaped, faceted stones were removed, with several smaller stones, and irregular fragments of stones. The large stones were an inch long and two thirds of an inch across. The duct admitted the forefinger into the liver and down to the pancreas. I washed out the duct in both directions, through a small catheter, with salt solution. A drainage tube of

½ an inch lumen was sewed into the duct, and the incision about it closed with fine silk. Externally to the duct and the foramen of Winslow a small cigarette gauze wick was placed. The patient made a splendid recovery after the operation, and is now in perfect health.

A second illustrative case is that of D. A. R., aged fifty-four years, patient of Dr. Hewitt of Springfield, Mass. At the first operation, August 10, 1905, after removing the gall-bladder, I opened the common duct and removed fragments of stone enough to make two stones, each ½ inch in diameter.

From that time to October, 1911, the patient had at intervals, attacks of pain and jaundice. In July, 1906, I had him under observation at Corey Hill Hospital, and tried to account for his symptoms in every way but the right one. He went on five years, suffering at intervals with the same symptoms, miserable in the extreme. On October 4, 1911, I found the common duct dilated to the size of a man's thumb, and from it I removed four stones three-fourths of an inch in diameter. I washed thoroughly the depths of the hepatic duct and searched long and hard, but in vain, for any signs of other stones. The patient went home well in about four weeks.

Did I overlook any other stones, or were any fragments left? I think not. But I do not feel absolutely sure; I could not *prove* that there were none left.

Impressed as I have been by the error of the overlooked stone, I am convinced that it is impossible always to avoid that error, even by the most thorough search, no matter how experienced the observer.

Provided the incision is large enough to admit the whole hand and permit palpation of the gall-bladder and the ducts between the thumb and fingers, there remain two places where the stone may be effectively concealed: one is the hepatic duct, up in the hepatic fissure, beyond the reach of palpation; the other is the pancreatic part of the common

duct, where a stone may be buried in the parenchyma of a nodular pancreatic head.

I am afraid that this source of error is unavoidable. The pancreatic head, as anyone experienced in abdominal palpation will admit, occasionally gives to the fingers a nodular feel, in which the nodule may be but normal pancreatic tissue, or, diagnosticated as nodular pancreatic tissue, may be a gallstone embedded in normal pancreas.

Be that as it may, the overlooked stone must never be forgotten as one of the unavoidable contingencies of biliary surgery. The contingency can be reduced to a minimum only by experience and care.

The overlooked stone is another theme, and the only one left. This will interest chiefly the surgeons of my audience, although the persistence of a discharge from the wound will annoy the attending physician and the patient, a fact sometimes forgotten by the operator.

If I have not said so already, I will say here, that in my opinion and experience gall-bladder surgery is a highly specialized branch of abdominal surgery, and that without experience he who undertakes operation in this field will bring his patient to grief. The diagnosis of the existing condition, with the abdomen wide open, will test at times the capacity of the most skilful. As I have demonstrated, the possibilities in the way of combinations are almost infinite. But of all the non-fatal errors—that is, the errors that do not cause death immediately—that of the overlooked stone is the most frequent.

In all obstructive diseases of the biliary tract caused by stone, the symptoms are almost always due to a single stone. That stone is the keystone to an obstruction even if many stones lie together in the ducts. The stones backed up in the biliary stream above the one solidly impacted have no effect whatever upon the symptoms except perhaps to irritate the ducts or the gall-bladder. In far too many cases the operator is content with the removal of the stones within

easy reach, and he trusts to luck that he has them all, without trying to discover any more farther away; or, as is generally the case, he is too inexperienced to find them if he does try.

The result is the sinus discharging clear mucus from the gall-bladder if a stone is overlooked in the cystic duct, and bile if it is left in the common duct.

As I have said, attacks of pain after the operation, and attacks precisely like those for which the operation was performed serve to discourage both physician and patient, but these are I think perhaps plugs of mucus, fragments broken from stones by the scoop, or other instrument, or perhaps a stone too small to be felt. Whatever the source, there is little to cause anxiety, for the attacks cease and never recur. The stone overlooked in the gall-bladder that has been drained remains and grows slowly larger. This stone is sometimes regarded as a newly formed one, but I am convinced that stones rarely, if ever, are formed anew, once the gall-bladder has been drained.

Doubtless, in many instances a stone is left in the gall-bladder, and causes no symptoms unless it falls into the place of the offending stone that was removed. A freely movable stone of moderate size may remain indefinitely in the gall-bladder without symptoms. Such a stone as large even as a small marble, a quarter or a third of an inch in diameter, may escape detection in a moderately tense gall-bladder, as I have remarked many times; but it is hard to see how a collapsed gall-bladder, in the operation of cholecystostomy, can hold even a small stone without the stone's being detected by palpation of the contiguous gall-bladder walls between the thumb and fingers.

It is different when the stone is left impacted in the cystic or common or hepatic duct. The symptoms are so characteristic that they need little comment. I have never seen a case of stone left impacted in the hepatic duct, though I have overlooked stones lost in that duct. Impactions there are extremely rare, not only because the stones are not

often formed in the liver, but because the lumen of the hepatic duct continually enlarges with the stream, and stones are washed away from impaction. I do not know of a single case in which I have found a stone there alone, with no stones in either cystic or common duct, or in the gall-bladder.

A stone impacted in the hepatic duct would cause jaundice with white feces and without drainage of any kind from the wound; impacted in the common duct, it would cause abundant flow of bile from the wound with white feces and without jaundice; in the cystic duct, colorless mucus with sometimes a stain of bile from the wound, with normal feces. In the last case there would be no bile stain were the stones so impacted as to prevent the passage of bile to the gall-bladder; but the stone often acts as a valve, and allows bile to go to the gall-bladder, but not from it.

Simple as is the mechanism of impacted stone, its seat is often overlooked.

The hardest to understand is the biliary fistula without jaundice and with bile-colored feces. This is a simple biliary fistula, and it occurs because for some reason it is easier for the bile to go out through the gall-bladder than through the common duct to the duodenum. There may still be a stone, one that permits some bile to go by, but causes just enough obstruction to keep the fistula open.

Now what is the reason why the stone is so frequently overlooked? Why are so many of my operations performed upon patients with an overlooked stone?

For two reasons or perhaps three. The first reason is because it is sometimes almost impossible for the most expert to detect a remaining stone.

The second, because the operator is unaccustomed to seek for gallstones, he is inexperienced both in the normal and in the abnormal feel and he does not know.

The third is the small incision which does not permit the introduction of the whole hand, and without the whole hand

in the abdomen so that the surgeon *may use thumb and fingers,* thorough palpation is impossible.

There are some rarer difficulties and dangers incident to gall-bladder work, with which the operator should be acquainted. Chief among these is the wounding of the portal vein, or the inferior cava. Such accidents are unusual, but are of the first magnitude, but always liable to occur.

I have never been so unfortunate as to wound the great veins. I do not know that wounds are common. Certainly those who make such errors do not rush into print with them. I know of one case in which the portal vein was cut, with fatal result. What the effect of ligating the whole portal vein would be, I do not know, but I suppose it would be fatal. In wounds of these veins I should try suture of the cut. Perhaps my training as an anatomist has made me particularly careful in dissecting about important structures, great bloodvessels, especially, but I have had no occasion to practice the repair of accidental wounds of arteries or veins anywhere in the body, although I have sutured successfully the axillary vein and the axillary artery.

In one way or another the bile ducts, common and hepatic, may be destroyed in gallstone operations. I know of two ways in which this has been done; in one accidentally, and, under the circumstances unavoidably; in the other deliberately and avoidably. The accidental way, practically unavoidable, was during a desperate effort to control a sudden deluge of blood from the depths of the wound, somewhere about the foramen of Winslow. Blood suddenly gushed up and overwhelmed the wound, making a boiling well of the whole, and necessitating the blind thrust and grasp of large hemostatic forceps, until the source was fortunately and by chance controlled. The surgeon, an experienced and skilful operator, was only too glad to get his patient to bed alive, with forceps still in place. A biliary fistula resulted upon which we operated six months later. The hepatic duct was obliterated for $\frac{3}{4}$ of an inch. Attempts

to bridge the gap were temporarily encouraging, but the patient died after a gallant fight of seven days.

Another serious but easily avoided accident is the tying of the hepatic and common ducts drawn up into the ligature of the cystic by traction upon and too great delivery of a freely movable gall-bladder. The cystic duct is drawn up with the gall-bladder, and the hepatic and common ducts follow. The three ducts make an inverted Y, of which the vertical arm is the cystic and the other two the hepatic and the common. A deep ligature of the pedicle may include these two arms. Jaundice follows, relieved later perhaps by sloughing of the pedicle, obliteration of the included duct and permanent biliary fistula. I tried to operate on one such case in which the history and anatomical findings strongly suggested this explanation. I know that the accident may happen because I have been on the lookout for it. It was first suggested as an anatomical possibility by Dr. Jones, and I have myself found and demonstrated the Y with my own ligature in place and on the point of being tied about the included ducts. This very serious blunder is sure to be committed sooner or later in cholecystectomies, when the anatomical conditions of laxity and mobility are fulfilled.

Great care is necessary in operating upon ancient gall-bladder cases lest the stomach, duodenum, or colon be wounded or torn. This accident is peculiarly liable to happen when there has been spontaneous evacuation of stones from the gall-bladder into these hollow viscera. A connecting and dense adhesion results which may easily tear into the alimentary canal. Not that the accident is so very serious if the rent is discovered and repaired. But here or elsewhere the tear may not be recognized, and the escape of septic material may go on unchecked after closure of the wound.

The best thing the would-be surgeon, without skill, experience, and the knowledge of anatomy can do, is to keep out

of the depths of the gall-bladder region, and steer clear of the structures that girdle the foramen of Winslow.

Incisions in the right upper quadrant seem peculiarly liable to cause hernia. The operator must be careful, therefore, in closing his wound, and the patient must wear a supporter for a long time.

Wonderful as it ever seems to the surgeon that his operations are so successful, there are ever present under even the most favoring circumstances chances of disaster, human and unpreventable. These were long ago aptly described as the contingencies of surgery by Richard M. Hodges, and if we reckon upon invariable success in our practice, whether of medicine or surgery, we shall one day be bitterly disappointed.

The contingencies of gall-bladder surgery, some of them easily avoidable and some humanly unavoidable, of which I have not as yet spoken, embrace a wide variety of accidents, with which the operating surgeon in the course of years gets only too familiar. Gall-bladder surgery is perhaps more likely to encounter them than less complicated fields. The biliary tract is anatomically so deeply placed and in such close relations with structures of the first magnitude that any complications affecting it are particularly serious.

But it is not the contiguous structures that are necessarily involved in the complications and dangers of biliary tract surgery. In my many years of operating I have seen about all the accidents that can be enumerated. This is the reason, I suppose, why I am always inclined to emphasize the contra-indications in a given case. Unless I can see my way clear to an operation of any kind or in any part of the body, no matter where or how trivial, I am not inclined to advise it. For have I not seen and known of fatalities after the most trivial? And in gall-bladder surgery especially is it important to take into consideration the unusual, the unexpected dangers—pulmonary embolism, hemorrhage, peritonitis, cholangitis, portal phlebitis, liver abscess,

pyemia, and septicemia. Besides these are the accidents of anesthesia, the blunders of carelessness, the overlooked gauzes, the burns and scalds of hot-water bottles, the thousand and one possibilities of disaster. All these things added to the dangers peculiar to the right upper quadrant dissection make the surgery of the gall-bladder heavy with responsibility for even the most skilful and experienced.

DISCUSSION

Dr. Samuel J. Mixter, of Boston.—There are so many accidents that can occur in operations upon the biliary tract and mistakes that can be made, that I wish to speak of a case where a mistake was made in not recognizing promptly an unusual condition. The patient was an old woman in whose case I opened the gall-bladder, removed the stones, and felt a stone at the head of the pancreas. It was a hard stone. I uncovered it with very little hemorrhage, and tried to shell it out. After I uncovered the top of what I felt was a stone, there was a tremendous gush of blood, and then I thought I recognized the true condition. I packed down to this, stopped the hemorrhage without difficulty, and completed the operation. The second day the woman bled a little, and the third day there was a tremendous gush of blood, a fatal hemorrhage. There was found to be a small aneurysm of the celiac axis, perfectly calcified, so that it was as hard as a stone. I had broken through this, and there was absolutely nothing to do in the way of remedying the difficulty except by packing. This is an unusual condition, one which I think should be borne in mind, and I certainly should recognize it a second time.

Dr. Henry O. Marcy, of Boston.—In my long years of experience in biliary operations, the first thing I would say in way of emphasis of this paper is thorough inspection before we do any operative work. This should be insisted upon, and in my work I endeavor to make the field clear, to be sure of my diagnosis before I do the surgical work. In my early practice I made mistakes in not doing this. If it should become necessary to make an exploration, the incision should be sufficiently large to afford free inspection. If the conditions indicate a serious operation one should carefully prepare for it before commencing the operation.

I remember the case of a woman who had been sick for many weeks. She was supposed to be dying of cancer, with no hope whatsoever that she would recover, but after a while she began to get well. Six weeks later it was found there was an obstruction about the sphincter muscle. Two large stones had ulcerated their way through, but there was no thought of biliary obstruction.

In the matter of diagnosis, as I said in the beginning, it may be necessary to make an exploration, obtain the advantage of visual inspection, and determine all the pathological factors.

As to the removal of the gall-bladder itself, if I had thought about it, I would like to have brought here a recent specimen illustrating the point made by Dr. Richardson, namely, if one keeps close to the attachment of the gall-bladder it is a reasonably safe operation. I think most of us in opening the abdomen frequently feel it is our duty to inspect this region, no matter whether there are symptoms or not. I have laid down the rule for a long time to inspect the biliary tract whenever I have opened the abdomen for some other pathological condition, and I have been surprised how often I have found complications.

This is a field in which we are learning much, and I am sure I am changing my opinions from year to year, and I would emphasize the importance and safety in proper hands of wise operative interference in biliary obstruction.

Dr. Joseph Ransohoff, of Cincinnati.—Dr. Richardson has called our attention to the probability of overlooking stone in operating for gallstones. In one city of Germany, where they operate more frequently for gallstones and gallstone trouble than in any other part of the world, they divide the people or patients into two classes, namely, those who come to have gallstones removed for the first time, and those who come to have some removed that were overlooked at the first operation. Now, we must not blame ourselves invariably because a second operation has to be done. Just as one group of gallstones can form, with infection of the gall-bladder, there is no reason why a second infection cannot occur and a second crop of stones form. This is particularly the case if one has removed a great many gallstones, and I pointed out a number of years ago that the gallstones you remove are of the same size, the same color, rubbed against one another, and evidently like peas in a pod, all formed at the same time. In addition to that, if there are other stones, you will find one or two that look as if they had

been there indefinitely. In these cases we have repeated infections of the gall-bladder, and even if we have not overlooked the stone, the reinfection of the gall-bladder is responsible for the recurrence of the symptoms by the formation of new stones.

There is another thing concerning which I would like to get the assistance of the members of the Association. Some years ago I was asked to do a laparotomy in a case of supposed appendicitis. When the patient was brought in upon the operating table we noticed one thing immediately, and that was, the yellow appearance of the umbilicus—a localized jaundice there. We made the incision as for an appendix operation, but when we came upon the peritoneum it looked yellow, and when opened there was an enormous gush of bile. The patient had a ruptured duct.

I have seen this condition twice since, indicating pathognomonically free bile in the abdominal cavity. I know of two other cases, one reported by a gentleman from Louisville, and another one reported by a gentleman from the South, in which this symptom has been seen. I would like to ask the assistance of the members in reporting to me any cases they may have of such localized jaundice about the umbilicus found at operation.

Dr. I. S. Stone, of Washington, D. C.—Dr. Richardson's paper has awakened in my mind the recollection of the first paper published in this country on this subject, which made a great impression upon me and upon the profession generally, and that was the contribution of the late Christian Fenger. He sent around to the members of the profession a very fine reprint, and after reading it, my interest was excited and directed to this particular kind of work. I am reminded by the paper we have heard to-day of that man's wonderful production, as he was considered one of the greatest teachers of surgical pathology in the United States.

In regard to what we have seen, our observation must necessarily be of a personal character, and our remarks in the nature of a personal recital of what we have observed along these lines.

Dr. Ransohoff has called our attention to the after appearance of stone, and this recalls the function of the ducts when the gall-bladder has been removed. I will limit my remarks to that feature of the subject. Some years ago, when I was preparing a paper upon the advisability of removing the gall-bladder in operations for gallstones, when the gall-bladder was more or less

diseased, I wrote to Dr. Richardson regarding the matter, and he said at that time he was doing more and more surgery in that direction, namely, removing the gall-bladder.

I have had at least two cases in mind this morning where stones were formed subsequently in the hepatic ducts, and the passage of these stones resulted in pain on each occasion, producing a peculiar form of stone, which undoubtedly explained the amount of pain caused by the exit of the stones and also the slight jaundice when one of the hepatic ducts is involved. These stones are darker in color, and I have every reason to believe it is possible for a stone to begin to form in the hepatic duct and get through the cystic duct into the gall-bladder. There are certain cases in which such accidents have happened, where such anomalies have been observed, and it is not due to the fact that the stone or stones were overlooked at the time of the cholelithotomy.

Another remarkable thing has occurred. I have had one case where a stone had broken down the common duct at the junction of the cystic and hepatic ducts. This case I reported in an article published in the *American Journal of the Medical Sciences*. I know of no accident more embarrassing, unless it is a hemorrhage, than to find you have broken down the duct in such a way that you must expect to leave off or make an attempt at its closure by anastomosis. Those of you who are familiar with the literature know that this has been done in several instances. I have had one case, and that I have reported, where the duct was closed satisfactorily enough to enable the common duct to carry off the bile with perfect results.

In regard to the function of the bile ducts, when the gall-bladder is removed, I recall one case where stones were found in the hepatic ducts with absolutely no gall-bladder present. That patient two weeks subsequent to operation, had a violent hemorrhage undoubtedly from the duodenum which exsanguinated her, and it was only by repeated saline infusion that her life was saved. It is the only case in which I have had a violent hemorrhage after a gall-bladder or gallstone operation. As I have said, there was no gall-bladder, and eleven large stones were impacted in the lower end of the two hepatic ducts.

Dr. Charles H. Mayo, of Rochester, Minnesota.—There is one point I want to speak of in relation to cholecystitis. The present trend will discredit surgery of the gall-bladder and its tracts. If you will look over the reports you will find that every

case in which the gall-bladder has been opened and drained on the supposition of being diseased, is labeled cholecystitis. Often it should be labeled exploration. After getting the history, the abdomen is opened and a pretty healthy looking gall-bladder is found. Some enlarged glands along the cystic and hepatic ducts as evidence of infection may be found and on opening the gall-bladder there may possibly be stinking bile in a healthy looking gall-bladder. The next case may be such that the gall-bladder does not need to be incised, but the symptoms and every thing you can find out about the case will lead you to make an exploration. When a surgeon finds that 80 per cent. of his operations are done for cholecystitis, and only 20 per cent. for gallstones, there is something radically wrong. Some of these operations should be labeled what they really are—explorations, and the surgeon should go on and hunt for something else within the abdomen which is causing the symptoms.

Dr. Albert Vander Veer, of Albany, New York.—We are learning, constantly learning, and that is what brought me to this meeting. All of the papers we have heard today and yesterday and day before have been very important and interesting in many ways, because we will continue to meet with gall-bladder cases, and all the knowledge we can acquire is going to be of benefit to our patients. My early cases were my sad cases because they were neglected. My next unfortunate cases were not operated upon because I thought at the time they were cases of cancer, but I learned after a time that this was not true. So today in every case that comes under my observation, or if sent to me with what is supposed to be gall-bladder trouble, I do not hesitate to make an exploratory incision, and very often we come upon a case in which the physician was mistaken, or in which I was mistaken in indorsing this diagnosis, and the patient makes a recovery after the removal perhaps of one stone, which was the cause of the trouble. I had my attention called to this matter a few years ago, and it taught me a very important lesson. One of my most intimate friends for many years told me that her husband was ill and had been for a year. He had had some of the very best physicians to see him. I saw him; he lived in a neighboring city, and I said to her, "I believe your husband has carcinoma of the pylorus." He was seventy-two years of age. He died soon after this. An autopsy was made; I attended it, and we found the pyloric end of the stomach perfect except there were half a dozen good-sized

stones in the gall-bladder. There was no trouble with the stomach. I shall always remember the sad expression on her face when she said: "Well, doctor, there was a mistake in diagnosis, after all. Could not these gallstones have been removed?" I have thought of that from that time on.

In regard to hemorrhage which Dr. Richardson laid so much stress on, I want to say, that this is a part of the abdomen I approach with greater apprehension than any other portion. I have had serious hemorrhages in the pelvis; I have had hemorrhages from injuring the iliac vessels, but those things have not distressed me. When I get down into the neighborhood of the gall-bladder and in that portion of the abdomen I am exceedingly careful. I begin my operations, classifying them like this: If I have a plain case of gallstone history and feel sure it is a simple case, I make my operation rapidly, get down to the gall-bladder, and if my diagnosis is confirmed, I go on with the operation, and I feel pretty well satisfied. But if I have one of those cases in which there is doubt regarding the diagnosis as to whether the head of the pancreas is implicated, or there is some malignant disease, I approach the case with care, and I was pleased to hear what Dr. Richardson said we can do with the finger. If you suspect malignancy, there is necessarily a mortality accompanying an exploratory incision. If you make an exploratory incision and find a malignant condition, you should inform the friends of the patient as to your findings and what the outcome will probably be. If we do too much in these cases, there is a mortality attending our work, and it is not pleasant to talk to the family afterward.

With reference to the condition of the gall-bladder and to pancreatitis, my experience is in the direction of free drainage. I learned some time ago that cholecystectomy did not bring the results I had hoped for, and I believe one of the reasons why my patients did not do well was because there was not sufficient drainage of the pancreas and congested condition of the blood-vessels. In doing the operation subsequently and resorting to free drainage the patients did much better. If the gall-bladder sinus does not heal, and you have a biliary fistula, secondary operation has brought with me no mortality at all. I can remove the gall-bladder afterward, protecting the liver, as Dr. Richardson says, because it is from there you get some unpleasant hemorrhages. But drainage is a thing that I love to have my patients participate in, although it becomes tedious after a while, but it can be controlled.

In regard to a moderately small stone lodged in the common duct, I do not think I have ever suffered more mental distress than in closing an incision in the common duct, closing it so that it could go on to restoration of function. A moderate sized stone can be removed. If you pack carefully down to it and keep up good drainage these wounds will heal nicely and nature does the rest.

A SUGGESTION IN RHINOPLASTY

By E. Denegre Martin, M.D.
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It is not my purpose to discuss at any great length the subject of rhinoplasty, nor to reproduce the many cuts and quote the numerous suggestions too well known to surgeons for the restoration of this organ, the loss or deformity of which is so disfiguring; but to treat more especially of the pre-operative stage and the common causes of failure. There is no field of surgery in congenital or acquired deformities which, in my opinion, calls forth more good judgment and perfect technique and in which failures are more numerous and probably more apparent. Text-books all devote pages to the methods employed but not a word to the importance of laying the proper foundations for the finishing touches. The inexperienced surgeon, allured by the flattering results reported by the methods of Lisfranc, Langenbach, Nélaton, and a score of others, devotes his attention to the shaping of flaps rather than to the existing conditions and the future results.

Though my experience is limited to 4 cases of rhinoplasty, I have had a fairly large experience in other deformities requiring plastic operations. My failures have been traceable to lack of experience, and it is of the causes of these failures I desire to speak.

Success in plastic work depends upon establishing circulation in the new flap. Where the loss of tissue has been extensive, scar tissue exists in proportion, and especially is this true along the border of the nares. If this scar tissue

is not removed the new flaps when connected are apt to slough, if not altogether, to the extent at least of requiring further surgical attention, such failures complicating the results all the more. By a brief description of my cases I believe I can best illustrate the points at issue.

Case I.—The first patient had lost the nose from a syphilitic ulcer. Under treatment the ulcer had entirely healed, the nasal passages were patulous, and though the scar tissue was extensive, I was able by dissecting this quite freely to get a new base, and adopting the Indian method, took the flaps from the forehead, leaving a small projection in the centre for the columna, sutured the flap to the side and centre, and inserted rubber tubes to keep the nasal orifices patulous. This case proved my first failure. The flap was rather scant, sufficient allowance not having been made for shrinkage. It required weeks of dilating to prevent the nares from closing. To avoid recurrence of this annoyance in the future, I adopted the suggestion used in Case II, and which has proved eminently successful in two cases, and will always prevent the contraction of the nares. The flap is taken from the forehead, cut oval at the base as suggested by Petrali and others, and likened by Petrali to the form of a mulberry leaf. The edges of the free end are thinned sufficiently to turn under about half an inch on either side of the middle line; these, being inverted and held fast by mattress sutures, form the columna, which, by this method, is also covered with skin; this not only lines the nares with skin but reënforces as well and gives more stability to the flap. In Case II it gave not only excellent results but one operation completed the work.

Case II.—Some interesting features in this case are worth mentioning, as they were of special interest, and failure would have resulted had not an accident delayed the operation. When first seen by me this woman, whose nose had been destroyed by a syphilitic ulcer, had nearly recovered under constitutional treatment, the scar tissue was extensive, but

Fig. 1.—Case I. Showing shape of frontal flap.

Fig. 2.—Case II. Edges inverted to prevent contraction of nares.

Fig. 3.—Case III. Flaps sutured in position

there still remained an ulcerated area around the nasal opening, which existed on the day fixed for operation. This I believed of little importance, feeling that healing would continue under the new flap. In a short time the exuberant granulations so filled the orifice as to practically close it, and before the date fixed for rhinoplasty it was necessary to enlarge this opening and to prevent further closure by the application of Thiersch grafts. This case convinced me that plastic work should never be done until the adjacent surfaces have healed entirely and the maximum contraction of the scar tissue has taken place.

Case III was that of a negro preacher who had been shot in the face with small shot. The entire nose and both eyes were destroyed. The wound had healed, and both nasal openings were patulous. The eyeballs had been enucleated, as both chambers were ruptured; the inner canthus of the eyes and part of the lid on one side were destroyed. After reconstructing the lids so that artificial eyes could be inserted, I made the nose from the skin of the forehead. It is most important that the flap should be sufficiently large to allow for shrinkage and free of hair, if possible. To accomplish this I had to cut the flap obliquely to the left side. In this case there was very little tissue destroyed beyond that involving the nose, and a sufficiently large flap was easily obtained. It was cut wide at the free end, the edges rounded, thinned, turned under, and held in position with a mattress suture. The columna was formed by the inversion of the edges of the new flap as shown by the accompanying cut. The new columna was sutured in position, the nares kept well dilated with the finger while placing the flaps, thus forming the alæ of the new nose before suturing the entire flap in position. The denuded surface on the forehead was covered with Thiersch grafts. The result was immediate and excellent. The wounds healed primarily and the patient soon returned to his former occupation, a little disfigured, but still in the pulpit.

This idea is also carried out as part of Nélaton's operation in which he uses a piece of cartilage taken from the costal arch, which appeals to me as a very good suggestion, and which I would have adopted in one of these cases had I been familiar with the operation at that time.

Case IV.—A colored female, shot in the face with a load of small shot. The sight in both eyes was destroyed, the left was torn out of the socket, and all of the cheek on the left side and a portion of the malar bone were shot away, also the upper half of the lip on the left side and the entire nose. This was the most extensive destruction of skin tissue about the face that I have ever seen, and it required some knowledge of both mathematics and surgery in laying the foundation for its reconstruction. Sloughing was extensive and nothing could be done when first seen but to cleanse the wound and hasten the process of healing. As soon as the surface was in a healthy condition, I remodeled the upper lip from a portion of what was left from the cheek. In the second operation a flap was taken from the upper portion of the cheek, all was fairly well covered, leaving, however, a depression where the malar bone had been destroyed. This flap included a part of the lower lid, which was sutured back in place. As there was quite a depression on the left side of the face, it was evident that a flap from the forehead would have to be supported in order not only to give some shape to the new nose, but to prevent its collapse and the closure of the nares as well.

To accomplish this, I grafted the little finger of the left hand to the forehead at the site of the articulation of the nasal bones. This was done in the following manner and failed for reasons that I shall describe.

The finger was prepared, the nail and its matrix entirely removed, a most important procedure, else one may be confronted with a foreign body at some future time in the shape of a nail where least desired; the skin on the end of the finger removed, and the tip inserted under the skin at the base

of the nose. As the skin on the right side of the wound, including a small portion of the alæ, was intact, the skin on that side of the finger was dissected up and the new flap sutured to the freshened edges of the skin of the face on the right side. The hand was made fast to the head and left *in situ* ten days. The finger was then amputated at its base, the flaps modeled and sutured in position. As the surrounding edges, however, were made up of scar tissue, the circulation at the base of which was expected to maintain the vitality of the flap and the lower portion of the finger was inefficient, and what promised to give an excellent result, proved a failure.

Though failure here was due to lack of nutrition to the new flaps, it is possible that this might not have occurred had the hand been left *in situ* longer, but the patient became so restive that I feared she might tear it away from its anchorage and preferred taking chances on establishing circulation from the base. In this I erred, for the scar tissue was too extensive to dissect away, and had I done so there would have been nothing left but the periosteum and the bone.

In another case, where the destruction of the tissue was so extensive and the circulation in the new flap so impaired by scar tissue, I would resort to other means for securing my flap, feeling assured that a finger should be used only when the nose alone had been destroyed, and when the sides as well as the base could be connected to insure the vascularity of the flaps. The terminal phalanx of the finger fortunately was preserved, and though the cosmetic effect originally hoped for was not obtained, it served its purpose as a bridge. In the next step in the operation a new flap was taken from the forehead and modeled as in the preceding case.

This was sutured in position, the remaining portion of the finger which corresponded to the nasal bones in the normal face prevented the flap from collapsing and closing

the nares, again the columna failed to adhere, and in a few weeks the contraction of the facial flaps drew the newly made nose to the left.

The result has been a failure so far as appearances go, but no better result could be desired with regard to comfort. The entire raw surface is covered and the wounds have healed, the nasal orifices are patulous, respiration is normal, and no longer is she a repulsive sight to those around her. Had she her vision, I would make a further attempt to improve her appearance, but having gained all that could be desired so far as her comfort and health were concerned, I saw no reason to subject her to further operations merely to improve a condition she could not appreciate.

My experience in plastic surgery has taught me that we often make two serious errors: first, in attempting to reconstruct on a poor foundation, and second, in doing too much in one operation. The simplest methods which will accomplish the desired end should always be adopted. The more complicated the operation, the more prone to failure, and each failure adds to the difficulty. The many suggestions offered for bridging the nose are most alluring in their descriptions, but often failures in practice. They can be applied only in select cases; these should be well chosen and the numerous details carefully worked out before the operation is begun. The patient should be warned in advance of the possibility of failure and the necessity for repeated operations.

AN ARTISTIC AND MATHEMATICALLY ACCURATE METHOD OF REPAIRING THE DEFECT IN CASES OF HARELIP

By James E. Thompson, F.R.C.S. Eng.
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If ordinary surgical rules are observed there should be no difficulty in obtaining a good result after an operation on an average case of harelip. The improvement in the appearance of the patient is so striking that both the surgeon and the patient's parents are often content with work that will fail to satisfy the critical eye. A close scrutiny of each separate part, if carried out with merciless criticism will show numerous defects, and the completed lip is often a wretched imitation of Natures' masterpiece.

A study of the normal lip and nostrils reveals rare lines of beauty and symmetry (Plate I). The opening of the mouth is slightly curved from side to side, the convexity being directed upward. The mucous membrane of the upper lip is separated from the skin by a sharply defined line which is carried from one angle of the mouth to the other in a beautiful curve known as Cupid's bow. The convexity of the bow points upward toward the nostrils but the middle of the bow takes a sharp downward curve. The free edge of the lip is formed by mucous membrane. Its general direction is that of a plain curve from angle to angle with the convexity pointing upward, but at the middle, at a point corresponding to the downward curve of Cupid's

bow it forms a slight projection with the convexity pointing downward (prolabium).

Resting on the middle of Cupid's bow we have a pear-shaped depression which forms the centre of the upper lip. The stem of the pear fuses with the root of the columna nasi. It is the rarest event to find any difference between the nostrils either in symmetry or in size. The columna nasi is usually horizontal in position and stands more or less at right angles to the plane of the upper lip.

To reproduce these curves and lines is at once the dream and despair of the enthusiastic surgeon; and, as in a sketch, the slightest stroke of the pencil can alter the expression at the will of the artist, so in operating the proper or improper use of the scalpel may produce pleasing or grotesque effects at the will of the surgeon. Even the most sanguine operator never dreams of reproducing a Cupid's bow, but it is entirely within the range of possibility to create a line between skin and mucous membrane which will run across the newly formed lip without a break or fault.

I shall endeavor to explain how symmetry of the lip can be best reproduced along nature's lines, and in order to do this, it will be necessary to study in some detail the anatomical relationships of the tissues forming the edges of the cleft.

To enable us to grasp these points more clearly let us examine, firstly, the tissues forming the sides of the cleft, and secondly, the condition of the flaring nostril.

I. THE SIDES OF THE CLEFT

A glance at the appended series of diagrams (Plate II) will show some of the conditions met with. *a*, *b* and *c* represent an incomplete cleft. *d*, *e* and *f* represent a cleft opening into the nostril. In *a* and *d* the sides of the cleft are represented as opposed to one another symmetrically

and as being equally developed. In *b* and *e* one side is shown well formed and developed, but the other is defective in size and diverges abruptly from its fellow. In *c* and *f* both sides are defective and diverge abruptly. These pictures are diagrammatic, but they represent types which are constantly repeating themselves in actual clinical cases.

As a rule, although the sides of the cleft may be irregular in shape, the thickness of the tissue, *i. e.*, the amount of skin and mucous membrane, is not defective. It occasionally happens, however, that one side of the cleft is thick and succulent, while the other is thin and attenuated.

In many cases, even where the edges of the cleft are well formed (see *a* and *d*) and lie but a short distance from one another, the depth of the sides is often less than it ought to be. If the sides are artificially brought together the lip will be seen to be too short and barely able to cover the toothless gums.

Another feature of great importance is the height to which the mucous membrane of the lip passes up the margins of the cleft. Sometimes it reaches the apex of the cleft on each side as shown in *a*. More often perhaps it mounts the sides unequally as shown in *b* and *c*. In complete clefts it practically never reaches the margin of the nostril as shown in *c*, *d*, and *e*, but ascends the sides of the cleft to a variable height as shown in *f*.

Still another feature of the greatest importance consists in the inequality in the depth of the mucous membrane. These features have been emphasized in *b* and *c*, and *e* and *f*.

A recapitulation of these peculiarities, which will receive serious attention later on, is as follows:

1. Asymmetry and irregular divergence of the edges of the cleft.

2. Want of proper depth in the tissues forming the margins of the cleft (short lip).

3. Irregularity in the height of mucous membrane lining each side of the cleft.

4. Unequal depth of the mucous membrane lining each side of the cleft.

II. THE FLARING NOSTRIL

In cases of complete cleft the nostril flares widely open. The amount of separation of the extremities of the ring of the nostril varies greatly. Sometimes they are almost in contact, in other cases they are wide apart and the nostril forms a huge slit like an elongated capital C lying on its side. Whatever may be the extent of the separation, one can always verify the following facts:

1. That the junction of the margin of the cleft lip and the ring of the nostril is shown on each side by a marked projection or shoulder.

2. That if a measurement be taken of the circumference of the nostril from one shoulder to the other, it will always coincide accurately with the measurement of the circumference of the normal nostril.

Both these points I have verified in all cases coming under my observation and I have reason to believe that they will be proved true by subsequent observations. They are shown diagrammatically in Fig. 1, where the shoulders are marked by crosses. If the open ring on the right is completed by bringing the crosses together, it will be reduced to the size of the one on the left, which represents the size of the normal nostril.

Flattening of the nose is another noticeable feature. It is of moderate degree in cases where the alveolar border of the jaw is intact. It is often very exaggerated where the cleft in the alveolar process is wide. In severe cases the cheek and the ala nasi on the affected side form a con-

tinuous flattened curve. Often the whole nose is flattened, the condition being probably due to a poorly developed triangular fibrocartilage and columna nasi.

DOUBLE HARELIP

So far the description has centred around single harelip, and as most of the essential features are identical in both the single and double forms, it is needless to reduplicate descriptions.

The condition of the intermaxillary process may complicate matters a little; but, if the bony process is pushed back in place or removed, the only problem confronting us is what use to make of the skin and mucous membrane covering it. This covering has various shapes. It may be roughly triangular or quadrilateral. It may be large or ridiculously small. Its free edge has a margin of mucous membrane of variable depth and this may run along the sides as high as the margin of the nostril. As described in single harelip the junction of the ring of the nostril and the margin of the cleft in the lip is always marked by a shoulder, and the circumference of the flaring nostril from shoulder to shoulder is what the normal nostril ought to measure.

A careful study of the facts presented above leads us to the conclusion, that, in order to obtain a satisfactory result from any operation, the following requirements must be satisfied:

1. The red line of the lip must extend in a clean unbroken curve from one side of the newly formed lip to the other.

2. The depth of the mucous membrane must be equal on each side of the line of suture.

3. The newly formed lip must not be too short, but must be lengthened so that it will more than cover the gums.

4. The nostril must be reproduced so as to have exactly the same dimensions as the sound nostril, and must consist of tissue of the same texture as the normal nostril.

5. There must be no flattening of the nose or ala nasi on the affected side.

For the last fifteen years I have been operating by a method which I believe has given me results that satisfy fully the first four requirements. For purposes of convenience, single and double harelip will be described separately. In the main, the flaps are pared according to the method of "Rose," but the conception and actual performance of the operation differ so radically from his that the operations are totally unlike.

In the first place, every incision is carefully and accurately measured by the simple expedient of pricking out the begining and end of a cut with a pair of sharp-pointed compasses. Nothing is left to chance, because it is evident that the most accurate and artistic eye is not at all times able, unaided, to make the flaps of equal length.

We have found that the cutaneous portion of the lip possesses only a slight degree of elasticity and extensibility, and that incisions made into the lip on one side of the cleft must always be of the same length as those on the other side, if the sides are to fit accurately. No tucking in of the skin is allowable, as in other regions of the body, and if it is attempted the result will be disastrous, for it is sure to lead to ugly elevations, depressions, and irregularities. An irregularity that would be of little importance elsewhere is so striking in the lip as to be unpardonable. Incisions in the lip that have sharp entering and projecting angles cannot be straightened out as in other parts of the body, and most of the operations which are founded on this assumption are founded on false premises and for practical purposes are very misleading. The mucous membrane on the other hand is more extensible than the skin, but as it is essential to unite mucous membrane to mucous membrane

only, it is equally necessary here to have the incisions of the same length on each side of the cleft.

The method employed will be easily understood by a study of the diagrams Figs. 1 to 6 inclusive.

Fig. 1 represents a case of single harelip with a complete cleft passing into the nostril. For purposes of convenience the red line of the lip has been represented as symmetrically placed on each side of the cleft. At A and A' the boundary between the cleft and the margin of the nostril is marked by a sharp projection or shoulder. A pair of sharp-pointed compasses regulated with a screw is used, and a measurement ($Y Z$) taken from the level of the opposed corners, A and A' directly downward, of such length that Z would lie on an imaginary line $K L$, which would complete the natural curve of the upper lip. The points of the compasses are now fixed apart at this distance ($Y Z$), and measurements are taken in the lip on each side of the cleft (shown in Fig. 2) commencing at A and A' respectively and passing to B and B'. The points B and B' are each close to the junction of the skin and the red line of mucous membrane and are so placed that $A B$ is equal in length to $A' B'$ and each one is the same length as $Y Z$. The points B and B' are permanently fixed by pricking the skin with the points of the compasses until blood appears.

The compasses are now readjusted and a measurement $B C$ is taken, the point C being on the free margin of the lip. The angle which $B C$ with $A B$ varies somewhat. Usually it is about 60 degrees. It must always be less 90 degrees if a projecting prolabium is to result from the completed operation. A similar point C' is taken on the other side of the cleft. Both C and C' are pricked with the points of the compasses. Being now ready to denude the sides of the clefts a retaining stitch of horsehair is passed through each side of the mucous membrane of the lip close to, but below, C and C'. The lip is transfixed with a narrow-bladed tenotomy knife at B, and the knife is carried with

a sawing sweep in a slight curve to A, where it emerges exactly at the shoulder. The lip is then divided along the line $B\ C$ and the tissue outlined by $A\ B\ C$ is removed. The same maneuver is carried out on the opposite side of the cleft, the knife passing along the line $A'B'C'$ (Fig. 2).

The result of this is, that we have two raw surfaces opposed to one another, the corresponding sides of which are equal in length. Thus $A\ B$ is equal to $A'\ B'$ and BC is equal to $B'\ C'$.

If A be united to A' and B to B' and C to C' the sides of the wound between these points can be brought into opposition with accuracy and a perfect lip will result such as is shown diagrammatically in Fig. 3.

In Fig. 4 the same operation is shown on a lip where the sides of the cleft are divergent. In order to get sufficient depth to the lip, the points B and B' are necessarily very far apart, but can be brought together with very little tension if the cheeks have been well mobilized beforehand. Otherwise the steps of the operation are identical with those shown in Figs. 2 and 3.

The treatment of double harelip is shown in Figs. 5 and 6. The shoulders marking the margins of the nostrils are shown at A and E, and at A' and E'. The triangle $E'\ D\ E$ shows the line of incision by which the central piece of skin covering the intermaxillary bone is pared. E and E' are placed on the inner margins of the nostrils. The sides $D\ E$ and $D\ E'$ are usually equal in length to one another and their length varies according to the depth of the central piece of skin. It must never be greater than AB and is usually much less. The points A, B, and C and A', B', and C' are chosen as described previously in the operation on single harelip. Fig. 6 shows the final appearance of the lip when the flaps have been cut and the parts approximated. The point A is in contact with E; A' with E'; the apex D, of the triangle $E'\ D\ E$, lies somewhere along the line $A\ B$; the point B is in contact with B', and C with C'.

Two essential points must be emphasized: (1) Under no circumstances must the circumference of the nostril be encroached upon. The shoulders that represent the margins of the nostril must be accurately approximated. (2) The points B and B' must be as close to the red line of the lip as possible, and must always be on the skin (upper side) of this line.

The various parts of the lip resulting from this method of operating are reproduced from elements normally present. They are free from the admixture of tissues of different texture and consistence. The nostril is formed entirely from the original nostril ring, and the parts consisting of skin and mucous membrane from skin and mucous membrane alone.

Accurate symmetry thus results, the nostril being of the proper size, the cutaneous portion of the lip of the right depth, the mucous membrane of the proper width, and the red line of the lip running from side to side without break or fault.

An examination of most of the diagrams explaining the operation described in monographs and text-books shows many discrepancies between the claims of the authors and the real results.

I have analyzed the drawings representing the stages of some of these operations and have placed, for purposes of comparison, those pictured by the authors alongside others made by myself, which I believe are more true to actual life.

The result of the comparison is somewhat startling and some of the procedures are reduced to grotesque absurdities. To avoid any suspicion of unfairness, I have analyzed operations with good points as carefully as those with bad ones.

The descriptions and criticisms are appended to the diagrams.

OPERATION OF MIRAULT

The diagrams appended *a* and *b* Fig. 7 are modified from those pictured in Bryant and Buck's *Surgery,* vol. v, p. 511. The description which follows is based on the altered lettering of the figures used by the authors while at the same time an attempt has been made to clear up some ambiguities of the original text.

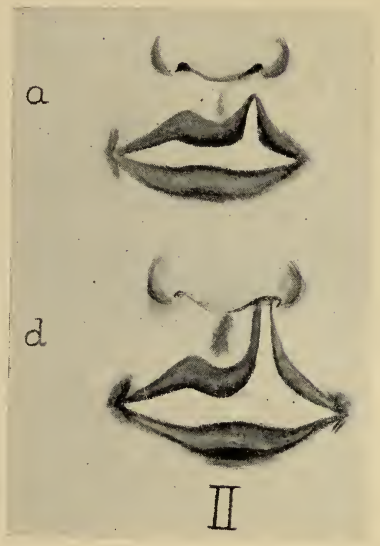
The point A is fixed at a short distance above the apex of the defect. In cases of complete cleft there would be two points A and A' each situated at the margin of the nostril. The dotted line CK represents one which would complete the curve of the upper lip if no cleft existed. The point C is definitely fixed. On this line a point K is taken which is usually on the more oblique side of the cleft and lies directly under the most pronounced part of the curve. At this same part of the curve on the skin side of the lip but close to mucous membrane a point B is taken. Three points have thus been fixed, viz., A, B, and C. On the opposite side of the cleft (*i. e.,* the more perpendicular) a point B' is taken. The selection of this is very important. It must be so placed that its distance from the point A, *i. e.,* $B'A$ must be equal to BA and its distance from the nearest point of the margin of the lip $B'K'$ must be equal to BK.

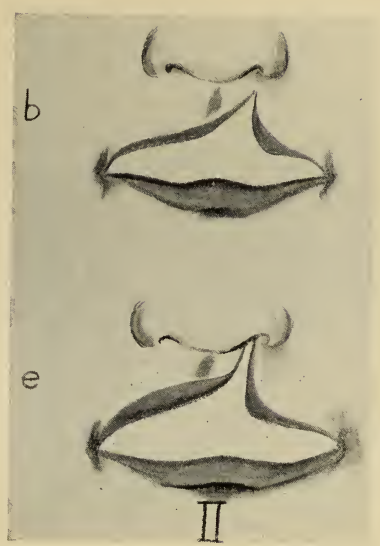
Along the line $B'A$ at point marked DD' an incision is carried into the cleft at the point C' in such manner that the length $B'D'C'$ shall measure the same as BC.

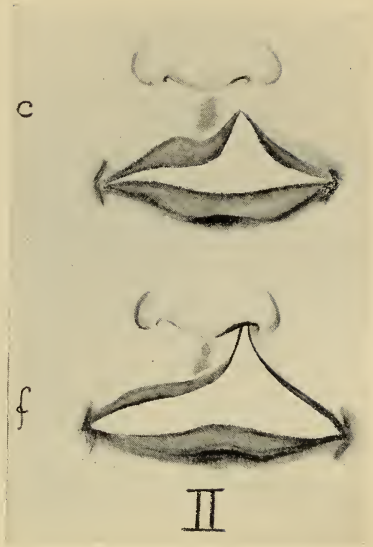
The margins of the cleft are denuded in the following manner: On the more oblique side of the cleft the points A, B, and C are joined by cuts which curve as in the diagram, care being taken to leave a projecting angle at B. On the other side the points A and B' are joined, and an incision carried from the point D to C', both cuts being curved as in the diagram. The result is shown in *b* Fig. 7, the flap

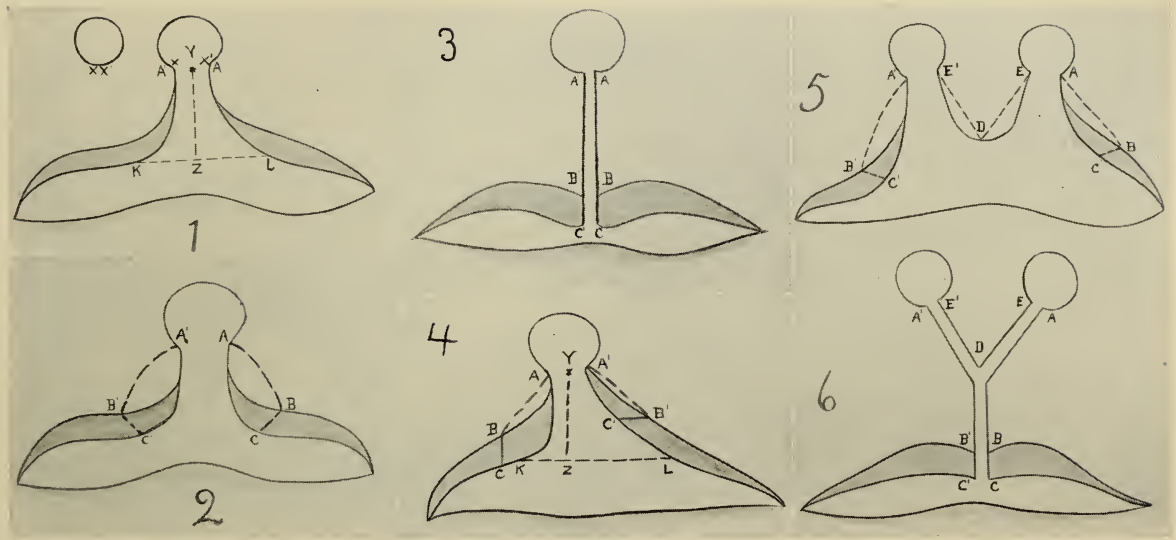
Plate I

Plate II









Figs. 1 to 6

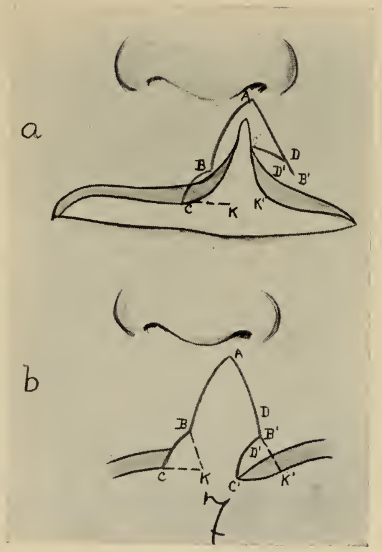


Fig. 7.—Operation of Mirault.

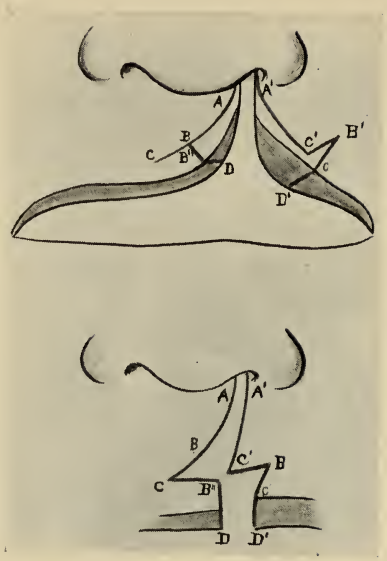


Fig. 8.—Operation of Simon.

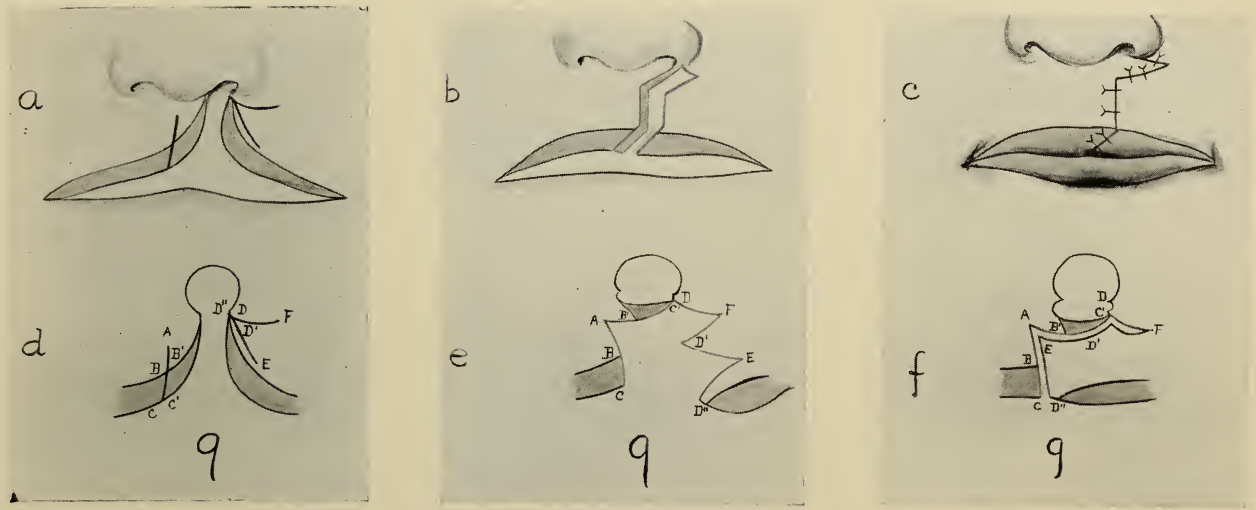


Fig. 9.—Operation of Giraldés.

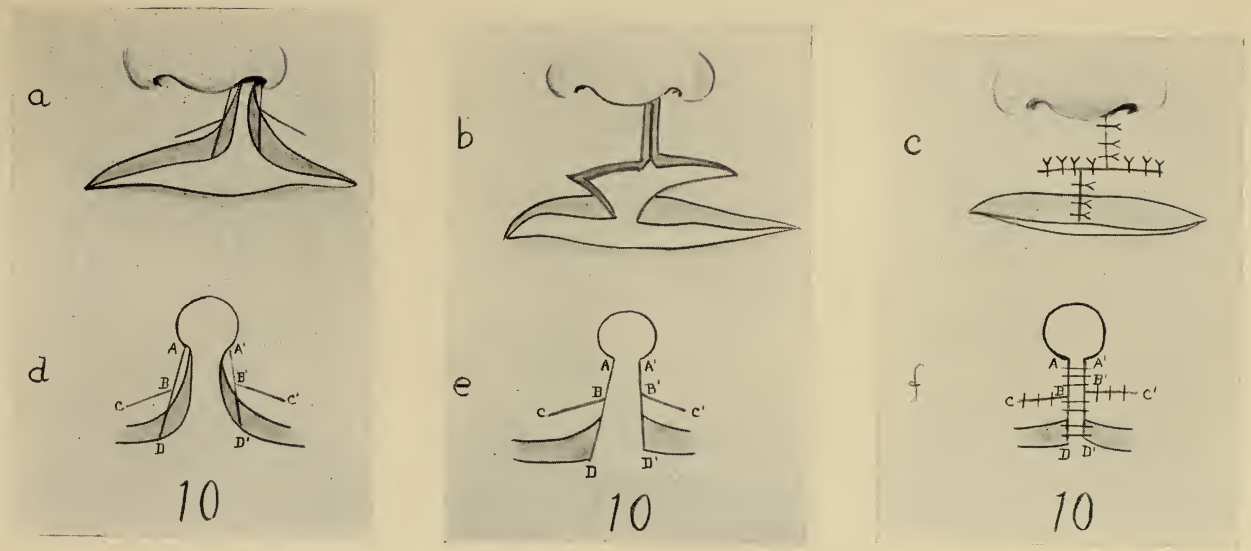


Fig. 10.—Operation of König.

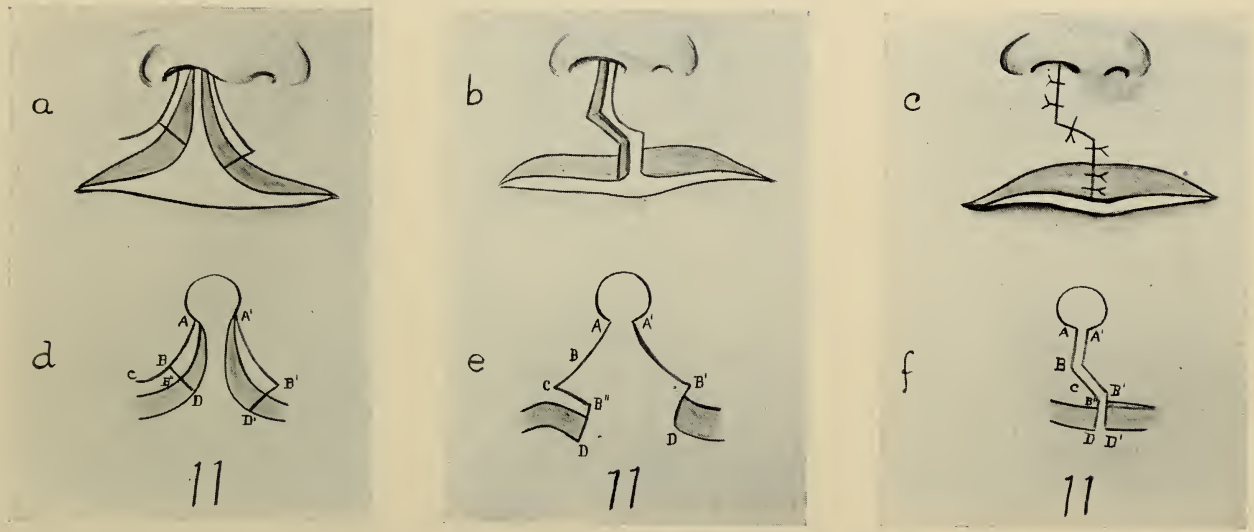


Fig. 11.—Operation of Esmarch and Kowalzig.

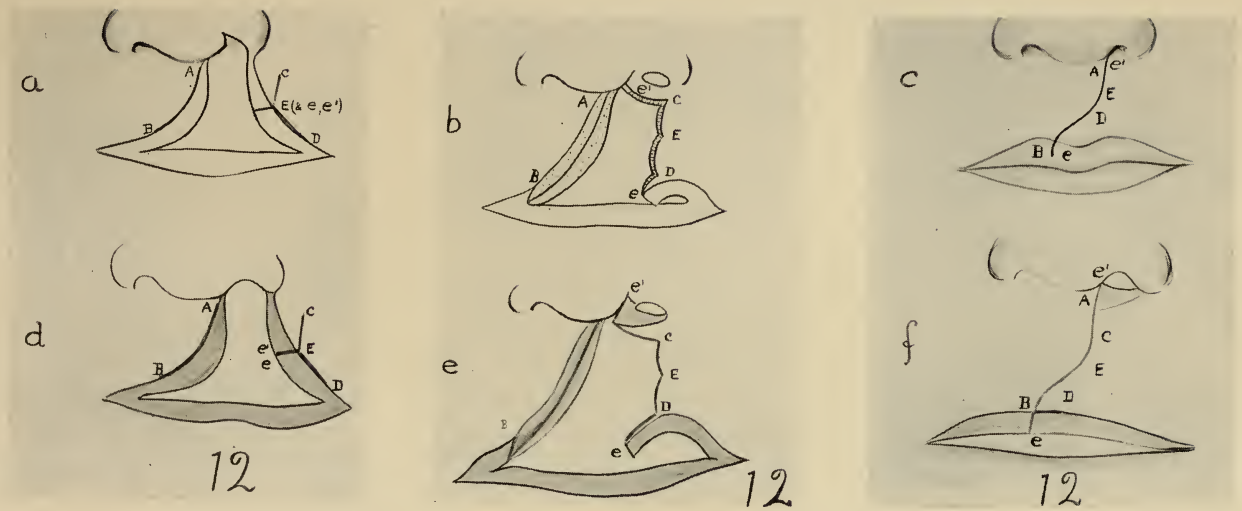


Fig. 12.—Operation of Collis.

$B'D'C'K'$ being drawn downward. Two flaps are thus opposed to one another, the corresponding sides of which are equal, $AB - AB'$ and $BC - B'C'$, and the projecting angle B fits into the entering angle B'.

My criticism of this operation is, as a whole, favorable. If carried out in the manner above described, and if all the salient points are pricked out accurately a good lip will result. There is, however, one feature that I have emphasized in my diagrams that seems to have escaped attention. No attempt is made to cut the mucous membrane of the lip on the more vertical side of the cleft in such a manner as to make it fit the cut edge of the other side. Thus *b* in Fig. 7 shows a good broad area of mucous membrane on one side (left) and a narrow, tapering, strip of mucous membrane on the other (right) which fails to reach the line of suture. Such a result would be unsightly in the extreme.

OPERATION OF SIMON

The diagrams appended *a* and *b* Fig. 8 are modified from those appearing in Bryant and Buck, vol. v, p. 512. The lettering and explanation are my own. The points A and A' are respectively at the margins of the nostrils. A point C is taken, usually on the more oblique side of the cleft, and as far away from the mucous border as it is desired to add to the depth of the lip. On the other side of the cleft, close to the mucous border, a point C' (or C'') is fixed at such a distance from A' that the measurements AC and $A'C'$ must be equal. From C' carry a line upward into the lip at right angles as far as the point B'. The distance $C'B'$ must be equal to the distance of C from the mucous border of the lip (*i. e.*, the depth you wish to add to the lip). Then carry the line $B'C'$ (or $B'C''$) out to D', which is placed on the margin of the cleft. Prick indelibly all these points. On the other side of the cleft (the more

oblique) along the line CA take a point B (or B'') at such a distance from C that CB will be equal to $C'B'$. From this point carry a line to the margin of the cleft at the point D, in such a direction that the length BD will equal $B'D'$. (In order to make this line of the requisite length it may have to be cut very obliquely.) The edges of the cleft are now pared and the result is shown in *b* Fig 8. The opposed sides will fit into one another in a mortise fashion the lettered points coming into contact as follows: A with A', C with C', B'' with B, and D with D'. The point B will be on the line $A'C'$, and C'' along the line $B''D$.

The result in the main is very satisfactory if every step is carried out with accuracy. The only serious objection to the procedure, apart from its complexity, is that we cannot be sure of dividing the mucous membrane on each side of the cleft in such a manner that the surfaces will fit, because the direction of the line BD must be determined by its length which must always be equal to that of $B'D'$.

GIRALDÉS OPERATION (BINNIE)

a, *b*, and *c* Fig. 9 represent the figures usually given in the text-books; *d*, *e*, and *f* the actual stages of the operation.

Careful scrutiny and comparison will show that the end result pictured in Fig. *c* could never be obtained, but that the real result would turn out as shown in Fig. *f*. Note the patch of mucous membrane taken from the margin of the cleft forming the lower portion of the nostril ring. Note the wide nostril. Note further the wide section of mucous membrane on the right of the figure ceasing abruptly, and the mucous membrane on the left commencing at some distance from the line of suture. The result is a grotesque travesty of nature.

KÖNIG'S OPERATION (BINNIE)

a, b, and *c* Fig. 10 represent text-book figures; *d, e,* and *f* represent the actual result.

The differences between the two sets are but slight. An operation planned in such a manner could never lengthen the lip or prevent notching where a prolabium ought to be formed. Therefore Fig. *f* represents the final result more accurately than Fig. *c*.

ESMARCH AND KOWALZIG (BINNIE)

a, b, and *c* Fig. 11 represent text-book figures; *d, e,* and *f* represent the actual result.

In Fig. *c* the incisions are shown after the edges of the cleft have been pared. In order to obtain accurate approximation the line $A\ B\ C\ B'$ must be equal in length to the line $A'\ B'$. The point A would be approximated to A', the point B' to B'', and after the angle C' had been straightened out the points B and C would lie somewhere along the line $A'\ B'$. Fig. *f* represents an attempt to bring the diagram into keeping with Fig. *c*, although the angulation at B would be more accurately shown by a curve. Note the irregularity in the depth of the mucous membrane on each side of the line of union.

COLLIS' OPERATION (BINNIE)

a, b, and *c* Fig. 12 represent text-book pictures; *d, e,* and *f* represent the actual result.

This operation has much to recommend it, but the throwing up of the flap $C\ E'$ to form the floor of the nostril is a mistake according to our rules previously formulated. In

Fig. *f* the unsightly appearance is depicted. If care is taken in paring the mucous membrane at *B*, in Fig. *d* and *e*, so that it will correspond with the thickness of mucous membrane along the line *E e'* in Fig. *d*, a very good final result can be obtained at the lip margin as shown in Figs. *c* and *f*.

DISCUSSION ON THE PAPERS OF DRS. MARTIN AND THOMPSON

Dr. Truman W. Brophy, of Chicago (by invitation).—Inasmuch as you have extended to me the privileges of the floor, and this is a subject in which I am deeply interested, I would like to take a few moments to discuss more particularly the paper of Dr. Thompson.

I do not think any subject that has been brought before this meeting is more important than this one of dealing with defects of the lip. The essayist has taken a great deal of pains in the preparation of his drawings, and he has made his remarks very clear.

In the management of cases of this character, usually we first have to deal with another deformity, and that is the deformity of cleft palate. This should receive attention before the lip. The cleft should be closed in early infancy when the bones are soft and easily bent. By so doing we correct to a great extent the nasal defect.

If we find cleft palate associated with harelip of this character, we find the nose diverted to the opposite side. When we move the bones together at once the nose is carried to the median line where it should be.

The work of producing a lip should be done, in my opinion, without sacrificing any tissue whatever. I would disagree with the essayist in that respect. In his drawings later he shows the removal of certain parts of these tissues. In doing this work almost every day I have found that the principal difficulty met with is the shorter part of the lip is too full and the longer part of the lip is not full enough. The short part of the lip has a rolling upward of the mucosa to a greater extent than the long part. The surgeon should direct his knife in passing it into the lip so as to fold outward, where it is needed, in the long side of

the lip, the maximum of mucous membrane; and then pass the knife through the short side of the lip, the one having a greater fold of mucous membrane, so as to get the minimum amount of mucous membrane. The Nélaton operation, with the above modifications, is the most desirable.

All the tissues should be utilized, first taking into consideration the importance of producing a good nose. If you observe people for whom the operation for harelip has been performed, you will see that the majority of them have on the defective side a widely dilated nostril. In the work of forming a nostril and producing the nasolabial groove to correspond with the one on the normal side great care must be exercised. The tissue must be so manipulated as to overcome the defective nostril and form one which corresponds in size and shape to the normal one.

When we undertake to overcome a congenital defect or to perform any operation, we must do our best to bring abnormal parts back to their normal form or approach as nearly as possible normality. Following along this line, let me say that the premaxillary bones should never be excised. Too frequently this has been done, and the patient has been permanently deformed.

The depression of the lip, due to the loss of these bones, causes a deformity nearly as bad as that which the surgeon attempted to overcome. The removal of the premaxillary bones is never necessary. Nature has produced enough tissue to form a good lip; we should not remove any of it, but bring the separated parts in proper relation. In making the incision we carry the knife through the substance of the lip, carrying it up to the point where we wish, bringing down the flaps, having skin meet skin and mucous membrane meet mucous membrane, and by giving to the lip the prominence which it requires, we will have accomplished the result we desire.

In the case of double harelip, the method of procedure which the essayist illustrates is in accord with my own views except that I object to the removal of tissue. Wherever we remove tissue we must necessarily contract the lip just to the extent that we remove tissue. If we remove tissue, we must make the lip smaller than nature intended it should be. If we utilize all tissue in fixing it we will have accomplished the best result.

I want to make a statement regarding one thing, and that is the retention of the parts. You will find in some text-books

a large compress is put on the side of the face and clamped, Hainsby's compress. A few years ago I devised a simple contrivance made up of two adhesive strips, making them as broad as the cheek. Two fine dressmaker's hooks are fastened on the ends of the strips nearest the cleft lip. The cheeks are crowded toward the centre or median line of the face, ligatures are carried over the hooks and tied in such a way as to hold the lip quiet and make the separation of the wound impossible.

Immediately after the operation we cover the surface with boracic acid. The second day we clean off the surface and thereafter keep it absolutely exposed to view and clean. Formerly, we placed a strip of adhesive plaster over and across the lip, but we found the secretions would accumulate beneath and lead to unsatisfactory results. With this device, drawing the lips up, lacing them together, we can rest assured the lip will not again separate.

Dr. Martin (closing).—The method which has been described and demonstrated by Dr. Thompson is undoubtedly a step in advance in this particular line of surgical work. It is seldom we get a uniform flap in any deformity of this kind. Very often we have one inch on one side, and three-quarters of an inch on the other side. We know that if we have a long flap on one side we must make an angle in the other side to make the same length or to cover the distance from one point to the other.

Dr. Thompson has taught us an important lesson in the methods of measuring these flaps. I have a good deal of this work to do, and I am grateful to him for what he has said. I agree with Dr. Brophy that we should not destroy any more tissue than is necessary.

In holding the lip after operation, I prefer to use a simple figure-of-eight bandage, made of a half-inch strip of Z. O. plaster. It is brought under the chin and crossed over the nose to hold the cheek forward. It is not uncomfortable and the lip is not covered. I never dress the lip. I dust some aristol powder over it after operation. If you put on dressings the secretions are pent up and you are apt to have infection. In resection of the upper jaw, after suturing, I dust the wound with aristol powder, and if any secretions appear they are wiped off. Nature will take care of these conditions or secretions better than gauze.

TREATMENT OF VESICAL AND DIVERTICULAR CALCULI

By Hugh Hampton Young, M.D.
Baltimore, Maryland

Vesical calculi are so frequently associated with other conditions that the surgical operations are often indicated by the complicating conditions rather than by the presence of a calculus. In elderly men, in the great majority of cases, prostatic obstruction of some form is present. When it is a definite hypertrophy or carcinoma some form of prostatectomy is usually indicated, at which time the calculus can easily be removed. If the stone is a very large one it is unquestionably more feasible to remove it through the suprapubic region and do a suprapubic prostatectomy immediately afterwards if the patient is in condition. Where the stone is not huge, say not more than two inches in diameter, it can easily be removed through the perineum after removal of the lateral and median portions of the prostate by perineal prostatectomy. In most cases it is only necessary to dilate the internal sphincter with a dilator of some form in order to be able to extract the calculus through the dilated sphincter. When the stone is as large as two inches in diameter it may be advisable to divide the neck of the bladder with a scalpel before trying to draw the calculus out through the perineum. If such is done it is best usually to grasp the stone with forceps, draw it up into the vesical neck, and then while holding it in that position to cut the muscles of the vesical neck upon the stone, thus enlarging the opening sufficiently to draw out the

calculus. In some cases I have before removing the calculus placed the sutures through the edges of the incision so that as soon as the calculus was removed it was possible to unite again the muscular structures of the vesical neck, without any difficulty. This was done with the idea of preventing any possibility of incontinence after operation, but I can say, after an experience of at least 50 cases of calculi removed from the perineum after perineal prostatectomy, that such is very seldom necessary, that it is possible to dilate the vesical neck large enough to remove even very large stones without any fear of incontinence afterward. If the operator has approached the perineum through the space back of the triangular ligament and external sphincter, and thus has preserved these structures intact, there is practically no fear to be had of incontinence.

In cases in which there is no obstruction present the indications are often entirely different. Statistics gleaned from operative clinics all over the world show, without question of doubt, that the mortality following litholapaxy is by far the lowest of all the operative procedures. In India, where the English surgeons have operated upon many more cases than all of the rest of the world combined, the operation which is universally employed is litholapaxy, and surgeons elsewhere have been unable to approximate by any other method the splendid results and the low mortality rate which has resulted from the use of litholapaxy in India. Keegan was able to make a report on ten thousand cases, with an extremely small mortality; and this in spite of the fact that the majority of patients were children, so that it was necessary to use a small lithotrite, and often the calculus was very large, so that the operation was necessarily quite prolonged.

In this country, suprapubic lithotomy has, in a way, replaced all other procedures. This is due to the fact that it requires less expert skill, and that it is easier for the general surgeon to reach the bladder through the supra-

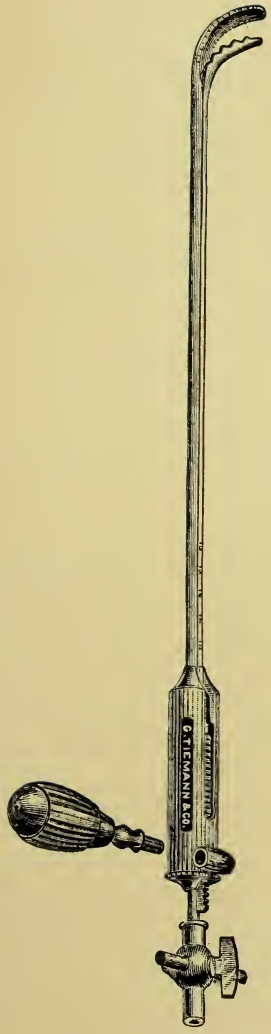


Fig. 1.—Chismore's evacuating lithotrite. Note the inconvenient mechanical details of the outer portion.

Fig. 2.—Young's evacuating cystoscopic lithotrite.

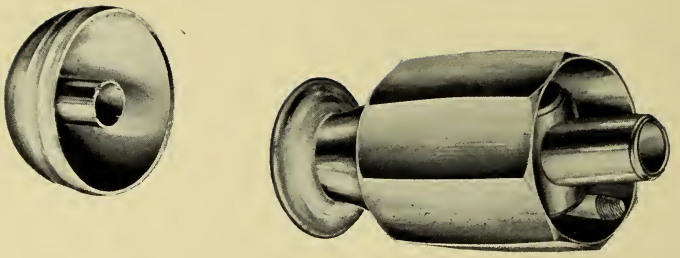


Fig. 3.—Showing the handle with the cap removed exposing the evacuating nozzle and stopcock, and showing the interior of the removable cap. Note the broad concave surfaces of the handle replacing the small rough serrations of Bigelow's instrument.

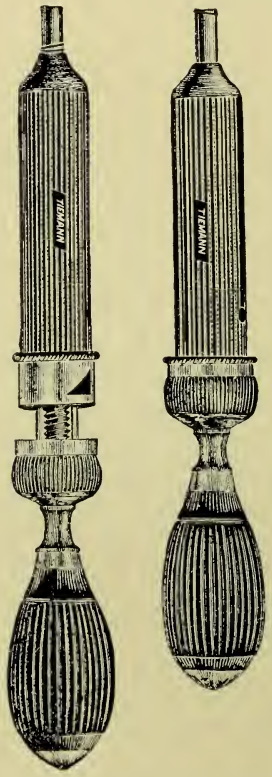


Fig. 4.—The handle of Bigelow's lithotrite open and closed. Note the rough serrations which often blister the hands.

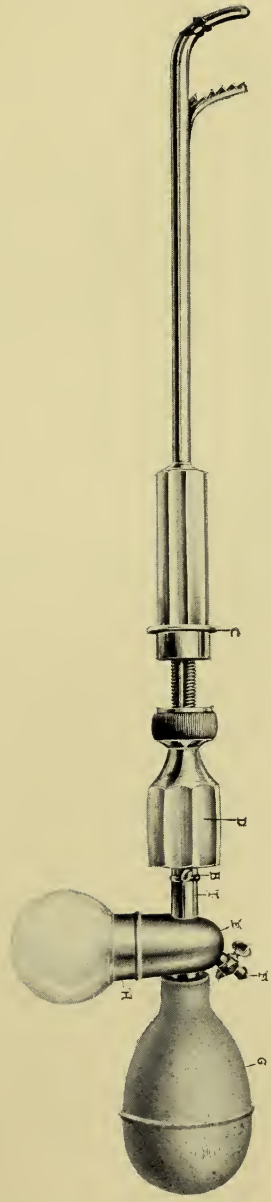


Fig. 5.—Evacuator attached to lithotrite. The stopcock, *B*, can be opened and closed while the evacuator is attached.

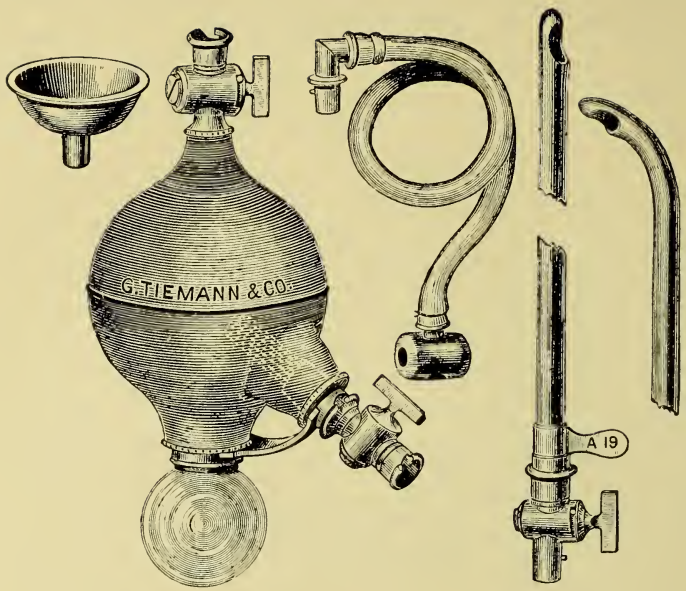


Fig. 6.—Bigelow's evaporating apparatus.

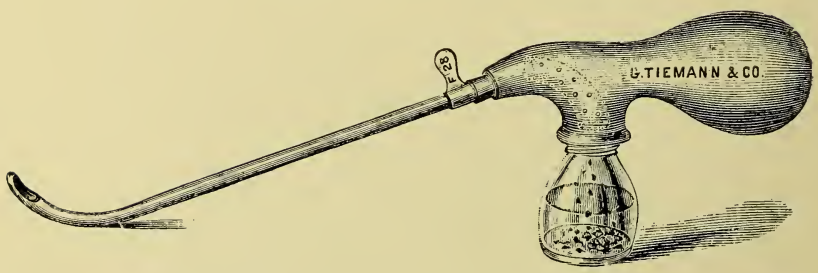


Fig. 7.—Chismore's evacuator. The perforated curved tube inside the rubber bulb keeps the fragments in constant motion during evacuation.

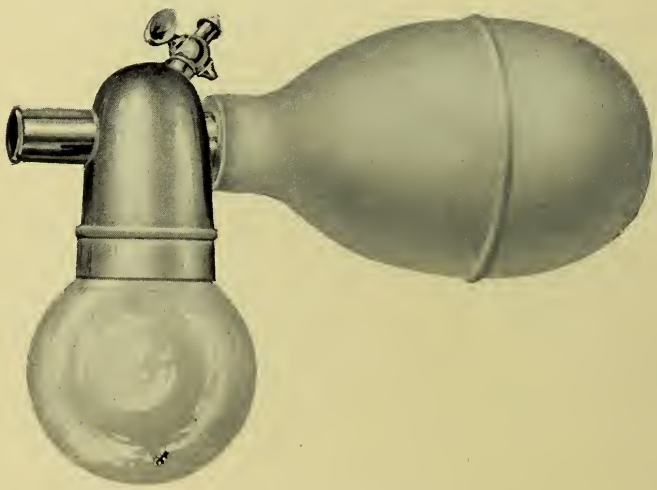


Fig. 8.—Young's evacuator.

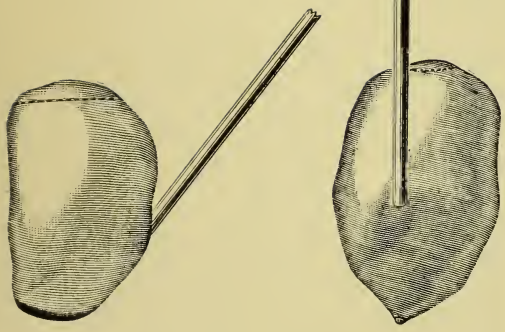


Fig. 11

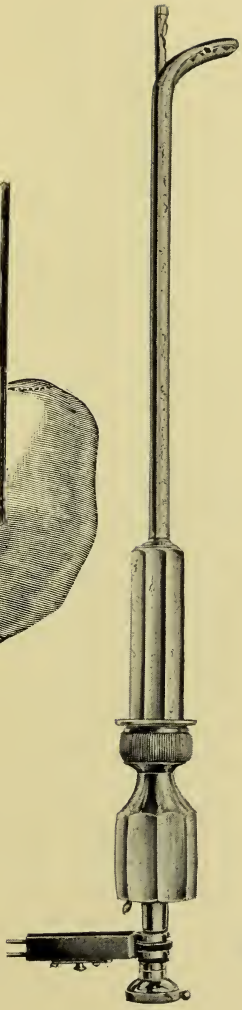


Fig. 9

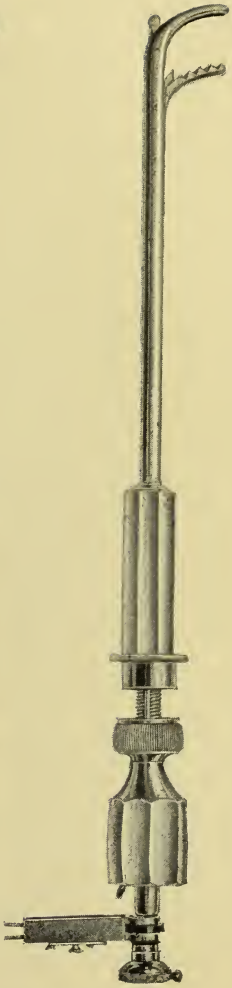


Fig. 10

Fig. 9.—Long straight cystoscope inserted through lithotrite for examination of bladder. Beak of lithotrite closed, held against the anterior wall while the search is made for calculi with the cystoscope.

Fig. 10.—Blades separated, cystoscope looking out between the blades as when about to pick up a fragment.

Fig. 11.—Plaster casts of the bladder when the lithotrite is depressing the base. Anterior and lateral view showing how the rest of the bladder drains into the jaws of the lithotrite. (Bigelow.)

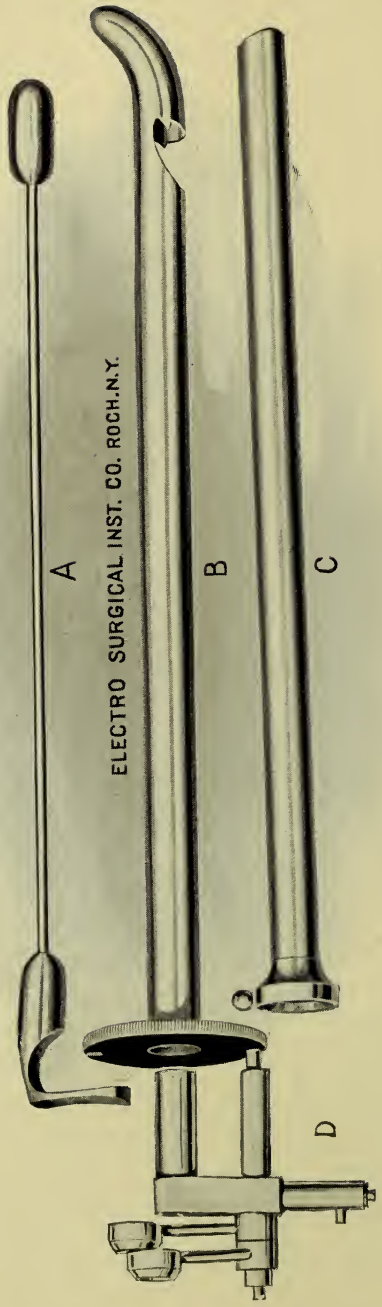


Fig. 12.—Urethroscopic median bar excisor: *A*, obturator; *B*, outer tube with fenestra to entrap bar; *C*, inner sharp steel cutting tube; *D*, external illumination. Size of instrument, No. 29, French.

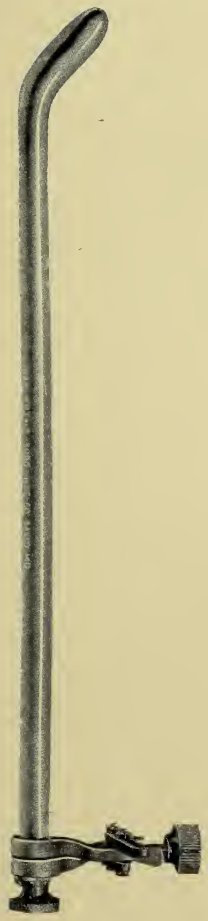


Fig. 13.—Intravesical cystoscopic rongeur, closed ready for introduction, obturator in place.

Fig. 14.—Intravesical cystoscopic rongeur, open; cystoscope in place, ready to use.

pubic region, and remove a stone than it is to do a litholapaxy or to go through the perineum where the musculature must be very carefully observed. Statistics, however, show that the mortality following suprapubic removal of stone is far from small, and in fact at least double the mortality of the simple perineal operation. Litholapaxy is in turn far simpler from the standpoint of the patient, and with unquestionably a lower mortality than the perineal operation. Why then has it not been established in this country as the operation of choice in cases in which there is no prostatic obstruction? The answer is simple. In the first place vesical calculus is a comparatively rare disease in this country, and general surgeons do not, as a rule, see a sufficient number of cases to become expert in the operation of the lithotrite. In the second place litholapaxy necessarily takes a little more time than a suprapubic cystotomy (and most American surgeons are frightfully busy, and time is an important object). In the third place, a suprapubic opening gives a chance to study the bladder, and guards against overlooking such complications as prostatic lobes, diverticula, and other vesical conditions. With the use of the modern cystoscope, which most busy general surgeons have neither the time nor the experience to use, it is entirely possible of course to study all these conditions before operation. Lastly, the difficulties of litholapaxy itself have not been small. When the stone is at all large it has been necessary, after crushing a portion of it, to remove the lithotrite on account of the collection of detritus, which had to be evacuated before the rest of the crushing could be proceeded with. In this way it was often necessary to remove the lithotrite and introduce the evacuator several times in order to complete the operation, and when the operation was supposedly complete one could not be absolutely certain that there was not a small fragment lodged in some part of the bladder which might lead to a recurrence of the calculus. The frequent introduction and withdrawal

of the lithotrite and the evacuating tube would generally lead to traumatism of the posterior urethra and prostate, and a hemorrhage which would interfere with further stone crushing and evacuation. When you thought you had completed the operation there was no certainty about it, and not infrequently patients returned in a short time complaining of painful symptoms produced by fragments which had not been evacuated. I am not alone in these disappointed experiences with the Bigelow apparatus for litholapaxy. In 1886, Chismore pointed out the same objections. He had attempted to do away with the necessity for repeated introduction of the lithotrite, difficulty in getting the last fragments, and the danger of not fully completing the operation by the invention of his evacuating lithotrite. With this he claimed that it was possible to draw the fragments by suction into the jaws of the instrument, and thus do away with the necessity of searching everywhere for fragments which might remain. Chismore showed, by his long series of successful cases, most of which were done under cocaine at his office, that he had unquestionably simplified litholapaxy. In my use of his instrument, however, notable defects were apparent. In the first place the coapted jaws present such rough surfaces that hemorrhage was often produced in introducing the instrument; then the knife-like male blade appeared to divide rather than comminute the fragments which were caught, thus rendering the crushing process slower; the central lumen of the instrument was so small that only very finely divided fragments could be evacuated through it; the mechanism by which the crushing was actuated (transverse handle with cogwheel action, Fig. 1) was clumsy, weak, unsatisfactory from a practical standpoint, and mechanically poor; the time required for litholapaxy was almost as long as with the Bigelow apparatus, the only saving being that it was not necessary to frequently withdraw the lithotrite and insert an evacuating tube, and

vice versa, and finally, when the operation was supposedly complete, there was still uncertainty lest some fragment be present in a remote portion of the bladder.

My dissatisfaction with the methods in vogue, which had been growing for many years, led me to attempt to devise instruments and methods by which the operation of litholapaxy could be made more rapid, less traumatic, and more certain. It was evident that the lithotrite and evacuator should be combined, and that the lumen of the evacuating male blade could be made considerably larger than in Chismore's instrument without impairing the strength of the instrument; that, in fact, a caliber of 28 French, a size which is smaller than the evacuator employed by Bigelow, Otis, Keegan, Keith, Freyer, Milton, and other great operators for stone, would be sufficiently small for ordinary usage in adult individuals; that it would be almost always possible to pass such an instrument without difficulty or traumatism except in cases of stricture or enlarged prostate, in both of which other operations are usually indicated. Then it was evident that the external mechanism of the Chismore instrument would have to be radically changed in order to get a mechanically nice instrument. I need not mention in detail the various stages by which slowly but gradually the model, which I am now presenting, was evolved. The complete lithotrite, as shown in Fig. 2, resembles the instrument of Bigelow, with important modifications. Both the male and female blades are made of steel, and are tubular in character, which, in proportion to the metal present, adds greatly to its strength. (We all know that even a thin tube is often stronger than a bar containing considerably more metal.) The male blade or inner tube has a lumen of 23 French, through which can be evacuated quite large fragments. These fragments can be drawn out either through the concave aspect of the female blade or through the convex posterior aspect, thus facilitating the process.

The principal novelty lies in the external handle, which is made hollow, and with a cap which can be quickly pulled off, thus uncovering the evacuating nozzle and stopcock, as shown in Fig. 3. When in use the stopcock is entirely concealed, and the handle is as effective as in any other instrument. With the cap removed the stopcock can be opened to empty the bladder or to introduce more fluid, or an evacuator can be attached for removing debris or drawing fragments into the jaws of the instrument. The latter procedure alone greatly facilitates litholapaxy after the first crushing of the large pieces has been accomplished.

As regards the minor details of the mechanism, I may say briefly that the fine serration or parallel ridges on the two handles of the Bigelow lithotrites (Fig. 4) were changed because in my experience they frequently lead to blistering of the hands of the operator, and after experimenting I found that large, slightly concave surfaces (Fig. 5, *D*) would give better purchase and avoid excoriation of the skin; they are also easier to clean. For the same reason the milling was omitted on the ring of metal which separated the handle of the female blade from the lock or clutch, and in its place a large, flat, projecting ring or washer was substituted (Fig. 5, *C*). This has been found a great help, not only because injury to the skin is thus avoided, but also a point for counterpressure, useful in separating the two blades, is obtained. By placing the tip of the thumb of the right hand against this projecting ring, the male blade can be pushed in and out with much greater nicety than when the two hands are not thus brought into muscular coördination. The handle of the female blade has been fenestrated on both sides (Figs. 12, 13) so as to facilitate cleaning and drying of the instrument.

In fashioning the jaws, the principles laid down by Bigelow have been followed with the exception that the extremely pointed end of the female blade has been reduced considerably. As advised by Bigelow, the cavity

of the female blade is broad, shallow, with only slightly elevated sides and the male blade is narrower, and with the teeth so constructed as to force the fragments outward, and thus avoid packing of the instrument and its consequent clogging with debris. The suction of the evacuator, however, prevents clogging.

In examining various Bigelow instruments made by different makers, I find that these points on which Bigelow insisted so strenuously have been disregarded by many makers. This is particularly true with the instruments made abroad, in which the cup of the female blade is extremely deep and promptly packs with debris, thus preventing the blades from closing completely, and making removal of the instrument more difficult. Had Bigelow's precise instructions been followed, I feel sure that the many complaints against the non-fenestrated blade would not have been heard of. One of the models of my instrument has been made with the fenestrated French female jaw and the correspondingly scalloped male jaw.

My first impression of this French model was that if the female blade were held tight against the posterior wall of the bladder, and the operation performed in accordance with the directions of Bigelow, that the posterior wall of the bladder would become injured by the fragments which would be pushed against it through the fenestrated female blade. Recent experience, however, with a number of cases, and also conversations with operators abroad have convinced me that this is not the case, and that it is entirely feasible to use this form of instrument after the method of Bigelow without any serious injury to the posterior wall of the bladder (and unquestionably these jaws do break up a stone more rapidly than the Bigelow jaws), and also that there is practically no possibility of their becoming packed with calculous debris.

In my first experience I used both the Bigelow and the Chismore evacuators. The Bigelow instrument (Fig. 6)

weighed twenty-four ounces, and this alone was an insuperable objection for its use for combined evacuation and stone crushing. The evacuator was so unwieldy and unhandy that delicate manipulations of the lithotrite while the evacuator was attached were almost impossible.

The Chismore apparatus was much more satisfactory, but the mechanical construction, particularly of the curved fenestrated metal tube, which is intended to lead the fragments into the glass bulb (Fig. 7), was such that the contents of the glass receptacle were kept constantly in a whirling motion and much of the detritus was forced back into the bladder, thus making the completion of the evacuation much slower. A manifest objection to both the Bigelow and Chismore evacuators is the special shape of the rubber bulbs, which are made especially for these instruments, and not generally carried in stock by instrument stores. The fact that all rubber goods deteriorate rapidly, and that such deterioration is apt not to be discovered until the instrument is desired for usage, makes it important to have an instrument in which an ordinary spheroidal or egg-shaped bulb, such as can be purchased in any drug store, can be used. I therefore set about to construct a new evacuating apparatus which should, first of all, be extremely light, and secondly be actuated by a rubber bulb of common usage. I also bore in mind the fact, brought out by previous experiments, that means should be provided so that the detritus could not be forced back from the bulb into the bladder, and that the instrument should have an air space in its uppermost portion in which collections of air, which invariably occur, owing to slight leakage at some contact point, could collect so as not to interfere with the evacuation, and from which this air could be allowed to escape occasionally by means of a cock; that the glass receptacle should be easily detachable, and, if possible, so fastened to the metal rim that it could be boiled. (Bigelow's

glass bulb is cemented with plaster of Paris and cannot be put in boiling water without danger of its coming apart.)

The results of these experiments are shown in the completed model, Fig. 8. As shown here, the bulb is of a type commonly in use for various purposes (the bulb of a Politzer bag or of a much advertised syringe for female usage, both of which are easily obtainable, can also be used.) In the dome-shaped central portion of the instrument air may collect or be evacuated through the stopcock above. Through the same vent an additional amount of fluid can be drawn into the instrument. Suspended from the dome is a pendulous sieve which flaps back and forth between the two tubular openings which lead respectively into the bladder and the rubber bulb. When water is forced into the bladder the sieve covers the opening and prevents the return of fragments, and when suction is produced it prevents fragments from being drawn into the bulb. It thus forces the fragments to drop only into the glass receptacle, and remain there. Owing to the direction of the inlet and outlet tubes the water in the glass bulb remains perfectly still, and the fragments are allowed to be at rest instead of being kept in constant motion, as in Chismore's evacuator.

In fastening the glass bulb to the metal lumen we have endeavored to use a cement (a solder melting at low temperatures) which will stand boiling; this is a very great desideratum. The entire evacuator weighs eight ounces, that of Bigelow twenty-four ounces, and its operation is in every respect much simpler and more delicate.

With a large tubular evacuating lithotrite it was at once apparent that it would be possible to construct a very long, straight cystoscope which could be introduced into the bladder, to determine whether any fragments remained, before the lithotrite was withdrawn. This has been successfully accomplished by Wappler (Figs. 9 and 10) in this country and Kny-Scheerer abroad, both of whom have

constructed instruments sufficiently long to reach the bladder through the lithotrite. It was found advisable to have the direction of the vision not at right angles, but slightly forward 12 degrees from the right angle), so as to be parallel to the two jaws. By this provision better illumination is secured, because the lamp lies in front of the female blade, whereas with a rectangular view the lamp would project behind the female blade, which would thus throw a shadow across the field of vision. With the fenestrated French female blade it is not so important to have a forward view, as light can easily penetrate the fenestrated beak. I have used the cystoscope in nearly all of my litholapaxies during the last year, and have found it generally possible to get a fair view of the bladder. With the lithotrite closed, and the beak directed upward, it is possible to search the bladder with the cystoscope (Fig. 9), which can be turned freely in any direction, the view being obtained behind the closed blades of the lithotrite. In none of my cases did I find any fragments present, but if such were found it would be an easy matter to turn the lithotrite in the direction of the calculus, separate the blades, and pick it up while steadily viewing it with the cystoscope.

I have now used this combined cystoscopic evacuating lithotrite in 10 cases, and the technique which has been evolved is as follows: After the usual antiseptic preparation of the external genitalia and urethra a *coudé* catheter is passed, the bladder washed out, and a 4 per cent. solution of cocaine injected into the bladder and urethra. After two minutes the catheter is again inserted, bladder washed clean, about 150 c.c. of sterile water deposited in the bladder, and the catheter then withdrawn. The lithotrite with the stopcock closed is then introduced, the handle elevated, and the posterior surface of the beak brought to bear firmly against the base of the bladder. The blades are then separated, and the usual procedure of stone crushing begun. As demonstrated by Bigelow, when the instru-

ment is in this position the stone will usually roll into the cavity of the female blade, where it is easily caught and crushed. This procedure is repeated frequently, still holding the shaft of the instrument in the position described above, so that the convex surface lies against the floor of the bladder in a depressed pouch, which ever directs the fragments to the blade of the lithotrite lying there (Fig. 11). When a considerable amount of detritus has accumulated the removable cap is pulled off the handle, the cock opened, the evacuator (previously filled with fluid) attached, and the evacuation begun.

It is always well to have two evacuators so that they can be rapidly changed as the fluid becomes cloudy. When the detritus ceases to escape into the bulb, one renews the crushing operation, and, as a rule, it is wise to do this with the evacuator attached to the lithotrite, and thus have the assistance of suction to draw the fragments into the jaws of the lithotrite. I usually have an assistant, standing on the left side of the patient to manipulate the evacuator while I work the lithotrite. The blades are separated, suction applied, and, when about complete, the blades are brought together. If a fragment is found between them the clutch is at once closed, and the fragment crushed with the screw. The blades are then separated, suction again applied, not only withdrawing the detritus just produced, but bringing other fragments into the jaws. In this way the operation proceeds rapidly (in my experience more rapidly than by the older methods), and in a short time no more fragments are found.

Up to this time the position of the outer shaft and female blade have not been changed, the beak resting against and depressing the floor of the bladder. It may now be well to turn the intrument obliquely to the right and left with the female blade still hugging the base of the bladder to see whether any fragments remain. Later, it is well to raise the beak from the mucous membrane and thus get suction

through the posterior fenestra, perhaps closing completely the jaws of the instrument in order to have all the suction come through the posterior opening and thus facilitate the evacuation of small detritus from the depths of the vesical pouches, etc.

In some cases, after the operation was thus apparently complete, there was little or no hemorrhage, and it was an easy matter to wash the bladder clear and filling it with filtered water to perform a satisfactory cystoscopy by introducing the cystoscope through the interior of the lithotrite as described above. At first the lithotrite should be closed, and the beak drawn up against the anterior wall, the cystoscope being used to study the bladder (Fig. 9). If a fragment is found the cystoscope is to be held firmly upon the object and the lithotrite opened and turned until the blades appear in the field (Fig. 10) and the object is grasped and crushed. The next procedure is to evacuate the fragments and again search for other calculi with the cystoscope.

The advantages claimed for this apparatus are that with the introduction of one instrument no larger than the evacuating tube which is ordinarily employed, the entire operation of stone crushing, evacuation, and cystoscopy can be successfully carried out; that in this way the traumatism, pain, and hemorrhage which are usually produced by the reintroduction of lithotrites and evacuating tubes through the prostatic urethra are avoided and the rapidity and satisfactory performance of the operation thus greatly increased, making it possible to employ cocaine anesthesia satisfactorily; that the use of simultaneous evacuation, drawing the fragments into the lithotrite, does away with much repeated searching all over the bladder and greatly hastens the operation; that the ability to perform cystoscopy before the lithotrite is removed does much to insure against leaving behind a fragment of calculus.

As to the mechanical features, I believe that it may be

safely asserted that this lithotrite constructed of thin tubular steel is adequate to any ordinary demands which may be placed upon it; that the external handles, composed of broad concave surfaces, are of great advantage, and that the hollow handle with removable cap which contains the stopcock and evacuating nozzle makes the instrument much easier to manipulate than that of Chismore; that the evacuating apparatus contains a pendulous sieve which prevents the fragments from going into the bulb or back into the bladder, thus directing them only into the glass receptacle; that the air chamber and vent in the upper part of the instrument provide requisites which were insisted on by Bigelow, but not provided in the evacuator of Chismore and others; and to have an evacuator which can be readily boiled is a great desideratum. Use of the bulb which is found commonly on the market, and the lightness of the evacuator are its chief attributes. As regards the cystoscope we may say that while Nitze, Casper, Lewis, Walker, and others have produced instruments by which small fragments may be picked up and crushed, this is the first addition of the cystoscope to a practical lithotrite large enough to be employed in all forms of vesical calculus.

Cases of Vesical Calculus Associated with a Small Median Bar. This is a condition which is not uncommonly present, especially in middle-aged men. In these cases the prostate is not hypertrophied, and a prostatectomy is therefore rarely to be considered. Careful examination shows, however, that there is a distinct elevation of the median portion of the prostate in the shape of a small transverse bar, generally fibrous in character, and associated with a certain amount of contracture of the vesical or prostatic orifice. In such cases if one simply performs litholapaxy there remains a certain amount of residual urine which is very apt to lead to a reformation of stone, so that the operation has to be repeated. Often there is an increase in the obstruction after the operation owing to the traumatism produced.

The suprapubic operation is not a good one in such cases because it is quite difficult to remove the urethral portion of a prostatic bar of this type through a suprapubic wound. A complete prostatectomy is usually out of the question because of the fibrous condition of the prostate, and the great difficulty of doing a complete prostatectomy, particularly in younger men. Besides that, one is not justified in removing the prostate completely in younger men, owing to the fact that serious disturbance of the sexual powers may result. In all such cases I have employed now, for three years past, the operation which I have called a urethroscopic excision of the median portion of the prostate or punch operation, this has been done with a special instrument which can be done through the urethra, shown in Fig. 12.

This instrument consists of a tube with a *coudé* prostatic curve which is fenestrated in the inferior aspect as shown in Fig. 12, *B*. It is provided with an obturator, Fig. 12, *A*, and the outer portion is constructed like the urethroscope and is provided with a similar illuminating attachment. An inner tube, Fig. 12, *C*, is provided, one end of which has a slightly oblique sharp cutting edge of steel, by means of which it is possible to excise anything which has been dropped into the fenestra of the outer tube. This instrument was devised for cases of small fibrous median prostatic bar, of which I have seen a considerable number. It is not intended for cases in which the lateral lobes of the prostate are enlarged, as in such cases the operation of prostatectomy is preferable. In application the instrument is inserted into the urethra until the beak almost enters the bladder. The obturator is then withdrawn and an inspection made. On looking through the tube, as a rule, the verumontanum is seen protruding into the fenestra. The instrument is then slowly pushed inward, the eye watching the passing structures until finally the median bar is seen to "pop" into the fenestra. As a rule it completely fills the lumen

of the instrument and the operator makes sure that the median bar has been entrapped by gently pulling outward upon the instrument, which will then be found to be caught around the median bar. The cutting inner tube is then inserted (the little round indicator turned up) toward the median bar and another glance taken to be sure that the latter is still entrapped. The inner tube is then quickly pushed home, cutting a large plug which represents the entire median bar which lies within the confines of the outer tube, the caliber of which is No. 29 F. The piece of tissue thus removed measures about 8 mm. in diameter and from 1 to 1.5 cm. in length. If the instrument is then withdrawn the plug of tissue will then be found in its depths. As a rule it has been found advisable to remove first a median section, as above described, and then, by turning the instrument obliquely downward, to remove the right lateral portion of the median bar, and then, turning downward and to the left, to remove the left lateral portion of the median bar. After each of these excisions the plug of excised tissue is removed from the interior of the urethroscope by use of the delicate rongeur forceps, by which it is easily grappled and removed. In this way the three excisions can be performed without withdrawing the urethroscope, and the whole operation can be done under cocaine with very little pain and discomfort, and a considerable amount of tissue can be easily excised, representing the median bar in its entirety.

I have now used the operation of litholapaxy followed by the punch operation in ten cases, with very satisfactory results. Some of these cases were in younger men, others in old men. One of the most recent cases was a patient, aged eighty-two years, too weak to take a general anesthetic, and in whom a complete prostatectomy and lithotomy might easily have been an extremely serious operation. The stone, which was about two inches in diameter, and quite hard, was crushed without much difficulty, and the

median portion of the prostate was afterward excised by means of the punch, three pieces being removed, and with practically no pain. In fact this punch operation is often very little more painful than the ordinary cystoscopy, at least so many patients assert. I believe that for cases of small median prostatic bars, often associated with chronic prostatitis, not infrequently in men under forty years of age, we have here an excellent and radical method of cure. I may say that while the hemorrhage is sometimes considerable, it has never been alarming, and is usually soon controlled by a double catheter through which warm irrigations are passed continually into the bladder and out again, and which is kept in place with the irrigation running for about forty-eight hours. The patient is given hexamethylenamin in large doses (40 to 60 grains daily) and water in abundance. After forty-eight hours the catheter is withdrawn, the patient being able to void, as a rule, without difficulty. Several of my cases have been operated on at the office, but I think this is usually inadvisable, as it is much better to send the patient to the hospital for a few days. In severe cases it may be best to use a general anesthetic, though I usually employ a urethral injection of 5 per cent. novocain in the urethra and bladder, which is washed out before the operation, and is usually sufficient to make the operation of stone crushing and the punch operation afterward practically painless.

The use of the punch operation will unquestionably do away with many of the cases of recurrent calculus after the ordinary litholapaxy operation, and I believe will do much to make surgeons more satisfied with the result of litholapaxy.

Diverticular Calculi. It has long been realized that vesical diverticula have been one of the most important complications of vesical calculus, and much has been written on the subject of encysted calculi. The following case well illustrates the point which I wish to make:

P. G., aged eighty-two years, came to me complaining of pain in the bladder. He had previously had several suprapubic and stone-crushing operations to remove calculi in the bladder, which quickly recurred after operation. He had had a perineal prostatectomy performed, which was entirely successful in removing the obstruction to urination, and he had been, for over a year after that operation, entirely free from discomfort, and with normal urination. He reports that he felt perfectly well until a month ago, when suddenly he felt pain at the neck of the bladder, and after that marked frequency of urination. These symptoms have continued up to the present time. While lying on his back he is quite comfortable, but as soon as he gets on his feet a desire to urinate is produced, and after that he has to void very frequently during the day. An examination showed no recurrence of the prostatic obstruction, no residual urine. The cystoscope, however, showed a large stone in the base of the bladder, and, on careful examination, at the apex of the bladder a small diverticular opening was seen, from which there projected the small point of a calculus. It was therefore thought inadvisable to perform litholapaxy and a suprapubic operation was performed. A calculus measuring 1 by 1½ inches in size was easily removed, on one surface of which was a small spicule or pedicle about one-quarter of an inch long, the outer end of which showed a recent fracture. The encysted calculus at the vertex of the bladder was then removed. It proved to be a stone about half an inch in diameter, and was tightly caught in the narrow orifice of a small diverticulum in which it lay. After dilating this orifice it was removed without difficulty, and was found to have a similar narrow pedicle which exactly fitted the projection or spicule from the large calculus, the two forming a dumb-bell calculus with an extremely narrow isthmus about half an inch long joining them. On returning to the history it seemed evident that the large calculus hung by this

slender connecting piece until about a month previously, when some sudden jar must have broken the stem connecting the two, allowing it to drop into the bladder, when for the first time it began to produce symptoms. Before closing the bladder I incised the edges of the orifice in two or three directions, and thus brought the diverticulum as much as possible into the bladder cavity. The patient has now gone two years since the last operation without any recurrence of calculus.

In another case of recurrent calculus I found, on examination, eight separate small diverticula along the posterior and lateral walls of the bladder each of which contained calculi varying from a few millimeters to 2 or 3 cm. in size. The orifices of the diverticula were again enlarged by incision, in some cases the cut edges being sutured with catgut to prevent recontraction. In this case there has been no recurrence of the calculi, and after a punch operation, which was subsequently performed, the patient is now entirely well.

In a third case, quite similar to the one last mentioned, separate small diverticula were again found, and the calculi removed, but the urine was very foul, ammoniacal in character, and there has been a recurrence of the calculi. The patient is very old and feeble, and no effort has been made to remove them as they are not causing very much trouble, but they can easily be seen with the cystoscope, and are also shown by the *x*-ray plate.

For cases such as those mentioned a suprapubic extraction of the calculus with operation upon the diverticulum is the method of choice. There is no fixed plan for treating the diverticulum which is universally satisfactory. In cases where there are multiple diverticula on the posterior wall, most of which diverticula project more or less into the peritoneal cavity, the question of complete excision is often impossible, and the best that one can do seems to me is to enlarge the orifices so as to afford better

drainage, and removing all obstruction, and treating the cystitis to try to prevent the reformation of calculi. When a single diverticulum is present, and at a place where it can be easily excised, this should usually be done. I have done this in several instances, in some of which the operation was extremely difficult, in others very simple. In the latter it was possible to draw the diverticulum into the bladder, and shell it out with very little difficulty. This can be done either by means of the finger outside of the bladder or by inserting a clamp and drawing the diverticulum into the bladder. In some cases it can be inverted as easily as a finger cot. A full discussion of the surgery of vesical diverticula was presented by me in this Association several years ago, and will be found in the TRANSACTIONS and also in Johns Hopkins Hospital Reports, vol. xiii.

When the orifice of the diverticulum is fairly large, and the diverticulum itself by no means completely filled by the calculus, which is small, it is entirely possible to remove calculi from such diverticula by means of my cystoscopic rongeur (Figs. 13 and 14). The first procedure of course is to have a careful cystoscopic examination, inserting the cystoscope into the diverticulum and carefully mapping out the size, number, and location of the calculi. Then introducing the cystoscopic rongeur, the orifice of the diverticulum is again located, and the beak of the rongeur inserted into the lumen of the diverticulum. The cystoscope is then drawn out until the outer end comes into the sheath of the instrument, when the rongeur can easily be pushed on into the diverticulum, after which the cystoscope is again pushed out so that the lamp and lens are clear of the sheath of the rongeur. By opening the blades with the external screw mechanism, no difficulty is experienced in picking up small calculi, even two or three together if they lie closely approximated, and withdrawing them from the diverticulum by reversing the procedure just described, *i. e.*,

pulling out the straight cystoscope, then withdrawing the rongeur from the diverticulum, turning the instrument and withdrawing it from the urethra, after which the calculi can be liberated from the jaws of the rongeur. This I have carried out now in three cases with great ease and under cocaine anesthesia. The calculi in all of these instances were small, but a future suprapubic extraction of these stones was probably saved. I have also been able to use this cystoscopic rongeur in two cases in removing calculi from the lower end of the ureter. In both of these instances the calculi projected well into the bladder from the lumen of the ureter, and not much difficulty was experienced in extracting them. In one instance it was necessary, before the stone could be completely removed, to grasp the mucous membrane of the constricting ureteral orifice, and to tear a portion of it away in order to allow the calculus to come out into the bladder. Subsequent examination, however, showed that this operation had been entirely satisfactory. In the more deeply incarcerated calculi, at the lower end of the ureter, this operation is not generally applicable, and the suprapubic operation with incision of the ureter covering the calculus should be the operation of choice.

The cystoscopic rongeur has also been very helpful in removing calculi attached to ligatures which in some way have been left in the bladder. One patient presented himself who had had a previous hernia operation, in which the bladder had been inadvertently opened and four silk sutures used to close it. The ends of these sutures projected into the bladder and each was covered with a calculus varying from 4 to 8 mm. in size. They were easily grasped, pulled off the ligatures, and removed one by one through the urethra under cocaine anesthesia and at a second sitting no difficulty was experienced in grasping the individual threads of the suture and pulling them forcibly from the bladder. The patient has since been cystoscoped and is entirely well.

Resume. In conclusion it may be said that vesical calculi are, as a rule, foreign bodies, more or less soft in character, which can be easily removed from the bladder without a suprapubic or perineal lithotomy unless complications exist. The most common of these complications is prostatic hypertrophy, and when this is present the removal of the calculus should be accompanied by prostatectomy either perineal or suprapubic. Litholapaxy should also never be performed in cases in which vesical diverticula are present, because of the danger of fragments getting into these diverticula, and leading to recurrent vesical calculi. If such occurs the suprapubic operation is usually indicated, attention being directed, after removal of the calculi, to the treatment of the diverticula, either by complete excision or by enlarging their orifices, so as to permit of successful drainage of the diverticula. If the diverticulum is large enough to admit a cystoscope and the calculus is not large, no difficulty is experienced in grasping with the cystoscopic rongeur and extracting it through the urethra. In youngish men in which a vesical calculus is associated with a median prostatic bar or other form of valvular obstruction at the prostatic orifice, after the stone had been removed with the lithotrite, the punch operation directed to remove the prostatic obstruction is a very valuable addition to litholapaxy, and should in the future reduce very greatly the recurrences of calculi after litholapaxy. It is an operation which can be done under cocaine, and with extremely satisfactory and radical results. In the performance of litholapaxy with the older instruments when it was necessary at first to introduce, withdraw, and reintroduce the lithotrite, and evacuating tube alternately several times in cases where the calculus was at all large, have made the operation of litholapaxy tedious, more or less uncertain, and often bloody, and at the end of the operation there was no means of knowing whether a fragment remained, to lead to a rapid recurrence of the symptoms.

With the use of an evacuating lithotrite the operation is considerably shortened and made more sure. It is usually necessary only to introduce the instrument once, and, as soon as a sufficient amount of crushing has been done, to evacuate the fragments which have accumulated through the instrument by means of an evacuating bulb which can be attached to the outer nipple of the instrument. The crushing can then be resumed, and in so doing it is often extremely helpful to use simultaneous evacuation and crushing. By this means it is possible to have an assistant operate the bulb and thus draw the fragments into the blade, the operator then bringing the jaws together. The whole technique proceeds with smoothness, and the fragments are sucked into the blades, crushed, and evacuated with great rapidity. When no more fragments are found, after a careful search, the bladder is washed out, and the long cystoscope introduced through the tube of the lithotrite, and an inspection made to see whether any fragments remain. If one were found it would not be difficult to grasp it by means of the jaws of the instrument and crush it, under cystoscopic inspection. By the various means above outlined it is possible to have in the operation of litholapaxy a rapid, certain, and safe method for completely removing calculi, and for preventing against their recurrence, all of which have militated in the past against the operation of litholapaxy, because it was neither rapid nor certain and recurrence was not infrequent.

DISCUSSION

Dr. Maurice H. Richardson, of Boston.—I was very glad to hear Dr. Young bring up the operation of Bigelow, and I hope he will get a picture of this operation for stone in order to teach the coming generations this wonderful operation which many surgeons have abandoned.

I happened to be with Bigelow at the time he did his last

operation for stone in the anatomical room of the Massachusetts General Hospital. I was acting as his assistant. As Dr. Young has well said, the reason men do not like litholapaxy is because they do not know the operation. For many cases of stone it is the most beautiful operation in the world. There is no cutting especially, and no blood.

Some time in the future I would like nothing better than to write my personal reminiscences of Bigelow and his operation, as I was brought into intimate relation with him.

Dr. Francis R. Hagner, of Washington, D. C.—I enjoyed Dr. Young's remarks very much indeed. He is a pioneer in the work he has spoken of. There is just one point Dr. Young made to which I desire to call attention and that is, that calculi will come to you in these cases, and they should come to the lithotrite. I think there is a certain group of cases where that is impossible, and where litholapaxy is indicated. In this connection I would like to cite a case which I had two years ago which demonstrates this fact. It was a patient of Dr. Hardin, of this city, a man, aged eighty-six years with enlarged prostate without obstruction. I knew if I opened the man's bladder and did not remove the prostate he would probably have a fistula. The patient at the time of operation was feeble and very much depleted from pain and loss of rest. He had an encysted stone quite a distance behind the prostate. I felt pretty confident that I would be able to dislodge the stone. By introducing the lithotrite into the bladder, the bladder being filled with water, and introducing the finger into the rectum, I pushed the stone out of its place, grasped it, and crushed it. I feel sure if I had done a suprapubic operation he would have had a fistula. The old gentleman is living today, and in good health.

Speaking of Dr. Young's punch operation, it is a good operation for the cases in which he has recommended it; but I have had exactly the same experience with hemorrhage that the gentleman wrote to him about. When he first brought the operation out, he did not mention using the two-way tube for drainage. If the two-way tube is used the complication of clotting of blood in the bladder will not occur.

I cannot close my remarks without saying a few words about the instrument here. We have had operating cystoscopes for years, and they have been rather unsatisfactory, as the beaks closed out of view of the cystoscopic tube. Dr. Young has overcome that by having these two little jaws at this point (indicat-

ing) which close in the view of the cystoscope. It is a very easy instrument to use, and I think it simplifies intravesical operations; Dr. Young deserves great credit for the ingenuity he has displayed and for presenting this instrument to the profession.

Dr. Guy Leroy Hunner, of Baltimore.—I suppose one reason for the Bigelow operation not being done is the lack of altruism in general human nature. In other words, it is easier for most men to do the operation suprapubically than it is to learn how to do cystoscopy, and most men do not care to turn a patient over to a man who is specializing in his own city, and who would be able to do the operation in his office and let the patient go on about his business. The problem of attacking stones in the vesical end of the ureter in women is much simpler than in men, and if there is anything that makes me hot under the collar it is to see a general surgeon practise a mutilating operation to get out one of these stones from above. Fifty per cent. of the stones in the ureter occur in the pelvis, and a large percentage of these low down, and it is a simple thing to reach them from below. I dislike to see a patient operated on from above where a simpler route can so easily be followed. The general surgeon has not learned to attack these problems through the vaginal route, and he thinks it is easier for him to remove them by the upper route, but those who have had experience in removing small stones from the upper route would be surprised to know how easy it is to get them from below. We follow the dictum that Dr. Young mentioned of Bigelow, namely, to bring the stone to us. When you tackle a stone, after making a vaginal incision, the ureter has an awkward way of getting lost in the loose tissues of the base of the broad ligament. In most cases one can pass a catheter before attacking the stone, and that insures that the ureter is going to be easily found and be within reach, then, after making a vaginal incision and spreading the tissues, one can palpate the ureter with retained catheter, and throw a hook or ligature and draw the ureter out of the wound, locate the stone and make an incision and remove it, using no sutures to close the ureter as the soft tissues fold about it and leakage only lasts a few hours, if you have any at all.

Dr. E. Denegre Martin, of New Orleans.—I did not hear Dr. Young mention the after treatment that was resorted to and the reason for dilatation. I would like to ask him if there is any danger of secondary hemorrhage in these cases, and if there is any danger of the wound not uniting again?

Dr. Young.—You mean the punch operation of partial prostatectomy?

Dr. Martin.—Yes.

Dr. Young.—The treatment employed after the punch operation is simply to evacuate the clots, which have accumulated during the operation, through the hollow tube of the instrument, then to insert a two-way urethral catheter, either one made of rubber or one of the new gum coudé catheters which I have devised and had made abroad. Continuous irrigation is started at once, and the bladder washed free of blood and clots. If the end of the tube becomes plugged, by using a large syringe it is an easy matter either to aspirate the clots or by forcing more water into the bladder to dislodge them and start the flow again. After the patient has returned to his bed continuous irrigation from a ten gallon irrigator is maintained for about 48 hours, and if at any time the tubes become plugged with blood clots, by means of a large syringe they are dislodged, aspirated, or pushed back into the bladder. As a rule no difficulty is encountered in keeping the patient quite comfortable, and generally only one or two aspirations with the syringe will be necessary in the course of 48 hours, at which time the two-way catheter is removed, and the patient allowed to void naturally. In rare instances it is necessary to insert the catheter at sometime later on account of a small amount of blood clot which may prevent the patient from urinating freely. In a few instances we have had a secondary hemorrhage occur anywhere from five to eight days after the operation, but this is usually controlled at once by introducing a catheter, sometimes the two-way catheter with irrigation for a day or two longer. The hemorrhage while sometimes troublesome has never been dangerous, and in 92 cases in which we have now used this operation there has been no fatality from any cause whatever.

In my early cases I thought it was best to dilate the urethra after the operation, and in a few cases employed it, but I soon found that it was entirely unnecessary, and that stricture does not occur after this operation.

In fact as we know stricture of the posterior urethra is an extremely rare condition, and occurs in carcinoma and a few very rare cases of pronounced prostatitis. Dilatation is certainly not a necessary after treatment, either with the punch operation or with perineal prostatectomy if properly done. There is no trouble in regard to wound healing. I have cysto-

scoped many of these cases later, and have found that the mucous membrane very promptly heals over the cut, and the conditions are often absolutely normal in appearance.

I do not propose this operation, however, as one that should be popularly adopted. A very careful study of cases with cystoscope and otherwise is absolutely essential in order to determine whether this operation is indicated. Often some urethral or lateral obstruction exists which may prevent a cure being obtained by the punch operation, and it is only by a very careful study of the cases that this is made out. I have in two instances employed the operation without result, and found afterward that the lateral lobes were quite considerably hypertrophied. Both were fat men, and it was difficult to determine the condition of the lateral lobes, although rectal examinations were made. The cystoscope in both of these cases showed no lateral enlargement in the bladder.

In the after care of these patients it is absolutely essential that one should be prepared to evacuate blood clots should they occur. The first requisite is a good strong syringe by which powerful aspiration can be made in order to draw clots that might stop up the eye of the catheter. Evacuating tubes of large size, and evacuating bulbs should also be at hand, and the patient should be in a hospital where there is a resident physician well equipped for giving the patient proper attention of this sort, although it is rarely necessary to evacuate a clot more than once or twice during the convalescence, unless the instrument and the man is at hand harm can result, although the operation is itself an extremely simple one, and when the case is properly handled convalescence is a very slight affair. Used carefully in selected cases so as not to perform the punch operation on patients who ought to have a prostatectomy, it is better than a Bottini operation, and absolutely radical and safe, and satisfactory. It is particularly valuable where combined with litholapaxy as described in the body of my article.

LYMPHATIC EDEMA, ELEPHANTIASIS, OBSERVATIONS AND REMARKS, WITH REPORT OF OPERATIONS

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In the preparation of this paper I shall report some of my surgical cases, but I trust not in tiresome detail. Fig. 1 leads me up to the subject I desire to present in a somewhat retrospective manner.

Case I.—Mrs. A. B., aged forty years, with a good family history, came under my observation in May, 1866. I had seen somewhat similar cases in the hospitals, but this, a private patient, gave me an opportunity for careful study. She was the mother of three children, passing through each confinement without any increase of her trouble. At about the age of twenty she noticed an enlargement of the leg, below the knee, which gradually increased and involved the thigh. No acute symptoms or traumatisms had presented at any time, nor could pressure upon vessels above be discovered, from growths within the abdomen, except as to the possibility of an attack of appendicitis (inflammation of the bowels) that she had had when a child. The etiological factors being so obscure the diagnosis of elephantiasis was made. She was a native of the interior part of New York State and had not lived elsewhere. The case remained under observation for a number of years. Careful attention was given to her general health, as much rest as possible advised, and pressure, by means of bandages, was applied from toes

up to groin. This afforded relief, but when removed the general edema would return. Aside from the weight of the limb, and the rather increased tired feeling, resulting from doing her own housework, no other marked symptoms presented. There was no ulceration at any time. Patient jokingly remarked that "if the limb grew too large she would permit an operation for amputation." The case was evidently one of lymphatic edema, possibly congenital in character. No other like conditions presented elsewhere about her system. The limb became larger later in life and gave her much weariness, but operative surgical intervention was not attempted at any time.

Since observing this patient I have seen a few cases of distinct lymphatic edema of the lower extremities, one each complicated with enlargement of the scrotum and vulva, several arm cases following removal of the breast, in the female, and one in a young woman without tumor or operation. I have had no experience in cases of cervical rib causing swelling of the arm, as reported by Osler.

The study of the pathology and treatment of these cases has been exceedingly interesting. In my professional life I have seen so many serious surgical problems solved that I have desired at this time to place on record my experience with the present treatment of such lesions.

When Case VI—hereafter to be described—presented I was anxious to investigate further as to what had been accomplished regarding pathology and treatment within a few years. I have met with a number of cases of lymphatic edema appearing early and very late in some of my operations for removal of carcinoma of the breast, and upon which I wish to comment. The study of cases of enlargement of the arm, after extirpation of the breast, the chest muscles, and thorough removal of the lymph glands, or where a less severe operation is done, is very interesting. The edema of one or both arms that presents within six months or a year after the operations will very frequently yield to

the application of bandages, from the fingers up, at times using an elastic bandage with beneficial results. In cases of neuritis that present with edema I have seen great comfort afforded by the use of the galvanic current and also the employment of the *x*-rays. Evidently these cases are, not infrequently, the result of the blocking of the lymph channels. I have been greatly impressed in noting their persistency, and with the contrast between these cases and those where, in some instances, we have been obliged to remove a portion of the axillary vein; but the edema in these latter cases was not so persistent and yielded more readily to treatment, the lymph channels, evidently not being so seriously involved. These cases have been designated by many surgical writers as elephantiasis.

Case II.—Mrs. C. D., aged seventy-two years. One sister dead—due to a recurrence of tumor of the neck, and believed to be carcinoma. Patient menstruated at thirteen; one child; at the age of fifty years had excessive flow for several months, just at time of menopause. Latter part of 1904 noticed a lump in left breast, and she came under my observation in December, 1905. Diagnosis made, a little later, of adenocarcinoma. Operation for removal, also axillary glands, February 12, 1906. Wound healed kindly. Following six months there was some edema of the left arm which yielded to bandaging and her health was excellent for over two years. Patient remarkably active and free from pain. During October, 1908, she noticed a growth in the right breast; not painful, but some retraction of the nipple, and her previous history aroused suspicion as to the possibility of its being malignant. Not improving under treatment she was admitted to the hospital November 8, 1908, and thorough operation done for complete removal of the breast, together with the axillary glands. In view of her age, and the left breast having behaved so nicely, it was thought best not to do a more severe operation. The wound healed quickly, and patient left the hospital in less

than three weeks. She made a good recovery, but in May, 1909, noticed some pain in cicatrix, right breast, and a nodule could be felt. She was admitted to the hospital June 14, 1909, and old scar tissue, together with the pectoral muscles and subclavian glands, removed. Wound healed kindly and in ten days she returned to her home, remaining well until August, 1910, when lymphatic edema of the right arm presented in a most marked manner. Soon after an enlargement could be felt just under the right clavicle, evidently involving the periosteum. Bandaging of the arm was carried out fairly successfully and reduction of the enlargement followed. *X*-ray treatment relieved pain and there was some lessening of the metastases that involved the second and third ribs. There was no ulceration at any time, but patient gradually failed; there was metastasis to the stomach, and she died June, 1911.

Mrs. D. was kept pretty thoroughly upon arsenic and iron from the time of her first operation, and the bandaging did have an excellent effect in relieving the edema.

Case III.—Mrs. E. F. Operated upon May, 1889; entire removal of left breast, with lymphatic glands. About two years previously had been treated by Dr. T. Gaillard Thomas, of New York, for profuse uterine hemorrhage. No surgical intervention, and after a few months menstruation became normal and patient showed no further pelvic symptoms. She remained in very good health until about November, 1909, when she noticed a swelling of the left arm, which gradually developed into marked lymphatic edema, extending from the finger-tips to the shoulder. No evidence of any return of the disease could be noticed at this time. She had a decided arteriosclerosis and was benefited by the use of nitroglycerin. Patient gradually developed a neuritis of left shoulder and arm, and it was thought there was some enlargement of the supraclavicular glands, but the swelling of the arm did not increase. The edema of the arm and the neuritis continued, however, at

times better, then again more severe, and she was placed under the care of Dr. E. A. Bartlett, of Albany, N. Y., July 12, 1910, who has very recently, July, 1911, given me the following report of her case:

"Condition of patient upon coming under my observation: Left arm markedly edematous from shoulder to finger-tips, voluntary motion in arm and hand lost, complete anesthesia to touch, heat, and pin prick over whole of posterior aspect of arm, forearm, little finger and ring finger. Extensors over same area give no response to any form of electrical stimulation. Extensors of thumb and index and middle finger as all of the flexors respond to faradism (4 in. C.D.). Dull "booming" sensation complained of in arm and forearm and "aching" pain under left scapula; otherwise no pain. There is a tumor 1 x ¾ inch, appearing above the left clavicle and lying just back of posterior border of sternocleidomastoid muscle.

Diagnosis. Compression of brachial plexus by tumor described; tumor presumably malignant.

Treatment. Röntgen ray to tumor; high frequency current through vacuum electrode, galvanism and faradism, as from time to time indicated, to arm, forearm and hand. Medical treatment left to my colleague.

Present Condition. Tumor in neck has disappeared from above clavicle; edema slightly decreased; pain under scapula gone; pain in arm lessened and index finger and thumb can be approximated; other motion not restored.

Three months ago a tumor, 1 x ¾ inch, appeared on the right side of the neck at the upper posterior border of the sternocleidomastoid muscle which, under Röntgenization, has been reduced one-third. This tumor is also probably malignant."

This case is somewhat rare because of the very late appearance of the return of the carcinoma. The lymphatic edema of the whole arm was very marked, but yielded most decidedly to the use of bandaging and electrical treatment.

However, the patient has the evidence of carcinoma of the glands of the neck, and while being benefited by treatment the case is very serious.

Ligation of the artery for relief of lymphatic edema of the lower extremities does not present a record of entire satisfaction, as regards results. There has been a well-marked mortality list, due to gangrene following operation, and even though this last serious complication does not present, the results are not always in the line of cures.

Case IV.—For some years I was much interested in watching the case of Mr. G. H., aged fifty years, German, porter by occupation, who had been under my observation in the dispensary and hospital for a period of fifteen years, giving a history of some twenty years, during which he had noticed a gradual enlargement of the right leg, until it presented the characteristic appearance of lymphatic edema, with a tendency to ulceration, the ulcers, at times, healing, under continuous treatment by bandaging, yet the limb slowly became less useful and his symptoms more serious. He had been admitted to the Albany Hospital at various times, with marked relief following rest, elevation of the leg, and the use of bandages. December, 1907, Dr. Willis G. MacDonald and myself performed ligation of the femoral artery, in Scarpa's space, with excellent recovery. The patient did well, but there was not much diminution in size or permanent improvement. A year later the ulcers appeared in a more serious form and amputation was done through the middle third of the thigh. The patient convalesced nicely and was very much more comfortable afterward, but in this case ligation of the artery certainly did not bring the desired relief.

Case V, Fig. 2.—Mr. I. J. In many respects this case seemed quite unusual, and leads to the study of the possibility of phlebitis, believed to have produced lymphatic edema and many years after resulting in malignant growth. This patient was a native of Canada and by occupation a

carpenter. He served as a private during the Civil War. In the early part of his service he passed through an attack of typhoid fever, complicated with phlebitis of the right leg. Later he suffered considerable distress, after a long march, and the limb began to enlarge, increasing slowly for a period of twenty-five years, but not until about 1885 did he suffer any great pain. During this latter period he suffered from occasional sharp pain, and the limb showed a more decided tendency to enlarge about the knee. He entered my service at the Albany Hospital June 6, 1888. There was considerable edema of the leg itself. From the toes up to the upper third and from there up to the groin there was a uniform enlargement, more markedly distinct about and above the knee, and on the inner side producing a nodulated induration, at first thought to be the remains of his old venous obstruction. His thigh measured thirty inches in circumference. Bandaging from the toes up to the knee, and rest in bed reduced the size of the limb at that point very decidedly, but he could not tolerate bandaging from the knee up to the groin. The patient was unable to go on with his occupation, he was losing somewhat in flesh, more or less restless at night, and no improvement following treatment, and considering the case not proper for ligation of the femoral artery, amputation was suggested. To this he consented, after a period of palliative treatment. Operation was done in the upper third of the thigh and the patient made a good recovery. An examination of the specimen removed at the operation—although not having the benefit of an expert laboratory pathologist—showed the bone free from infection, but the growth about the knee, and extending up one-third of the thigh, seemed to be the nature of a distinct enchondroma. The patient did well and was alive ten years later.

At the present time a more reliable report could have been procured, regarding the possible malignancy of this case. Did we have here a distinct case of lymphatic

obstruction in which there was later grafted on a malignant condition?

I have had two cases, male and female, of what I believe to have been hematochyluria, associated with chylous dropsy. The male was operated upon for a supposed tubercular peritonitis and recovered. In the case of the female, at the time supposed to be one of ovarian tumor operation plainly revealed chylous dropsy, the patient dy ng later of peritonitis.

A more correct diagnosis could be reached at the present time by aid of careful laboratory investigation.

In reviewing this subject, and the cases, one observes that the same relative development has been made in the pathology, classification, and treatment of elephantiasis as in other lines of surgery. Much has been accomplished by writers who have had professional service in the tropics, West Indies, and South America, where this condition is met with more frequently. Here is where advances are being made from the surgical standpoint of operative intervention. No one factor has advanced the understanding of the pathology so much as the discovery of the Filaria Bancrofti and the influence the mosquito has in carrying and developing a condition of true elephantiasis.

C. W. Daniels, M.D. Camb., M.R.C.P. Lond., *British Med. Jour.*, October 31, 1908, p. 1360, writes as follows: "In most tropical countries elephantiasis—that is, chronic edema of the skin and subcutaneous connective tissues—is a common disease, and other evidences of lymphatic obstruction, such as chyluria, etc., are also fairly common. Much speculation as to the causation of this condition has taken place. Such lymphatic obstruction is not confined to the tropics. Marked typical cases occur in England, indistinguishable clinically from the elephantiasis of the tropics. Sometimes cases of Molluscum fibrosum are mistaken for it, but the true lymphatic elephantiasis does occur. Such cases are rare. I doubt if anyone here has seen a dozen,

Fig. 1.—Case I.

Fig. 3.—Case VI.

Fig. 2.—Case V.

Fig. 4.—Case VI

Fig. 5.—Case VI.

or if 20 cases could be collected from present inmates of English hospitals. Personally, I have only seen 2. The problem, therefore, is why lymphatic obstruction sufficient to cause chronic edema—a rare disease in England—in the tropics may affect 5, 10, 15 per cent. of the population. We know it may occur from several rare causes, but why should it be so common in the tropics unless a special cause exists. It has been stated that in French-China, Laigon, and surrounding country over 50 per cent. of the inhabitants had some form of elephantiasis.

"The discovery of the adult worm of F. Bancrofti living in the lymphatics naturally suggested a plausible hypothesis to account for this difference in frequency. It was early observed that filaria were common in the tropics and unknown in temperate climates, as elephantiasis is, or nearly so. In most cases of elephantiasis no filaria embryos were to be found—in fact, that it was the people who gave no direct evidence of filariasis who had lymphatic obstruction. So that, *prima facie*, it might be argued that the presence of filaria in the lymphatics prevented lymphatic obstruction. This would be a very narrow view. The wider one is that there is some connection between filariasis and elephantiasis. How close the connection is can be shown by more detailed examination as regards place, race, and sex incidence.

"One of the earliest statistical tables, as regards different races living in the same country, was that of Dr. Grieve among lunatics in British Guiana. He showed (May 15, 1883) that out of 400 inmates of the asylum, 0.5 of the Indian, 5.8 negroes, and 23.4 per cent. colored (mixed Europeans and negroes) were affected, and that 3.9 of the males had the condition as against 7.4 females."

On p. 1361 the same author continues as follows: "I do not think it necessary that all cases of elephantiasis need be assumed to be produced in the same manner by filaria; in some it may be hemorrhage, in others, perhaps common

ones, it is merely that the lymphatics, distended and altered by the filaria, are more liable to inflammation. Bacteria introduced may thrive and cause directly acute lymphangitis, may possibly cause death of the worm, and so cause indirectly lymphangitis."

Sir Patrick Manson and Dr. Louis W. Sambon (London), p. 1364, have given us some very excellent views on the pathology of the subject. The latter says: "There was no reason why Filaria Bancrofti should not prosper in certain parts of Europe. They knew that innumerable species of filariæ lived in the mammals, birds, and reptiles of Europe; some also in man, as, for instance, Filaria labialis, Filaria conjunctivæ, and other ill-determined species. All these filariæ were fostered and transmitted by anthropoid intermediary hosts, which might be flies, mosquitoes, or ticks, according to the species. Filaria immitis, the 'cruel filaria' of dogs, like F. Bancrofti, had a very wide distribution in tropical and subtropical countries, but it was also found in Northern Europe (France, Germany, Denmark, and England). Like Filaria Bancrofti, it was propagated by mosquitoes. If F. immitis could develop in Europe, there was no reason why F. Bancrofti should not be able to thrive equally as well."

One gathers the impression from this that there are many cases of elephantiasis in which the work of the mosquito and Filaria Bancrofti is not to be detected. We have yet before us the coming in contact with non-filarial cases that are developed as the result of serious neglected appendicitis, scarlet fever, edema following cirrhotic liver and kidneys, traumatisms, such as operations connected with the inguinal and pelvic regions, cicatrices resulting from burns and abscesses, injuries to the leg, typhoid fever, and results following phlebitis—any pathological change that may produce lymphatic dilatation and obstruction.

We have, then, the two conditions in which to make our diagnosis and to observe carefully the etiological factors,

i. e., the cases of non-filarial or lymphatic edema, and true elephantiasis. In making his diagnosis the surgeon of today is greatly aided by the results of careful laboratory investigations.

The gross macroscopic appearances, the objective symptoms, cannot be considered safely accurate to always form a correct diagnosis.

Statistics show that elephantiasis is more common in men than in women.

Rose and Carless, seventh edition: "Elephantiasis is a hypertrophic condition of the subcutaneous tissues and skin resulting from chronic lymphatic obstruction."

Two chief varieties are described: (1) E. arabum, due to a development in the lymphatics of living parasites, viz., the Filaria sanguinis hominis; (2) the non-filarial type, which may arise from many causes, such as the deposit of tuberculosis or cancerous material in lymphatic glands; the obliteration of lymphatic channels in operations for removing such glands; recurring attacks of lymphangitis in cases of chronic eczema or ulcer, leading to a gradually increasing obliteration of lymphatics.

Three chief phenomena manifest themselves as the outcome of such obstruction—viz., (*a*) *solid or lymphatic edema*, a condition in which the subcutaneous tissues become firm, infiltrated, and brawny, but the fluid cannot be expressed from them, as in an ordinary edema, and hence the part does not pit on pressure; (*b*) hyperplasis follows, affecting not only the subcutaneous tissues, which are greatly thickened, but also the skin, which becomes coarse and wart-like in appearance; (*c*) the warty stage is usually preceded by a development of vesicles (dilated lymphatics) in the papillæ, and from these when ruptured a considerable flow of lymph (lymphorrhea) may follow. If sepsis intervenes, chronic ulceration and recurrent lymphangitis may follow.

Elephantiasis arabum (syn. Barbadoes leg) requires but little notice here, as it is seldom seen in this country, being

mainly limited to the tropics, especially the West Indies and South America.

The *treatment* is extremely unsatisfactory. In the non-filarial variety elevation of the limb and elastic pressure are often the only remedies available; but when the condition is due to lymphatic obstruction in the groin, it may be possible to find the dilated lymph trunks and implant them into a tributary of the internal saphena vein (lymphangioplasty), so as to relieve the limb of its engorgement with lymph, a process facilitated by elevation of the limb and the use of elastic bandages. It has also been suggested to construct artificial lymphatics by introducing a carefully sterilized silk thread through the subcutaneous tissues of the thickened area, leaving it buried therein, and carrying it up into normal tissues. This has acted very satisfactorily in draining away the fluid from the elephantoid arms, sometimes seen in the last stages of a cancerous breast. Finally, when a limb is involved, amputation may be desirable.

In the filarial variety, if one can localize the situation of the parent filariæ, as has been possible in a few cases, they should be excised, but even then the lymphatic obstruction may persist. Mr. R. J. Godlee has treated several cases where the leg was affected by lymphangioplasty, and the results have been encouraging.

The *Practice of Surgery*, Spencer and Gask, pp. 293 and 294:

"*Elephantiasis* is a name which has been applied in the past to various affections, arising from different conditions in which the skin and subcutaneous tissues of the extremities undergo marked enlargement, and the surface becomes nodular and rugous, more or less like the hide of an elephant.

"*Elephantiasis* is the term now especially applied to the disease called elephantiasis arabum, and known to be the result of filariasis.

"Acquired elephantiasis, non-filarial in origin, may be

due to involvement of lymphatic trunks by inflammation, pelvic, appendicular, etc., or to the pressure of tumors or scars, especially from burns, or to infiltrating malignant disease (Fig. 122), or it may be due to the wounding or the excision of main lymphatics."

Musser and Kelly, 1910, vol. ii, pp. 807 and 808:

Filaria Bancrofti: The mature Filaria Bancrofti (Filaria nocturna; Filaria sanguinis hominis) inhabits the lymph spaces, especially of the scrotum, vulva, and lower extremities, causing in those parts the well-known affection, elephantiasis. It may produce inflammation of the genito-urinary tract, with chyluria and hematuria; chylous ascites may also be caused by it. The sexually mature filariæ are viviparous, and the larvæ quickly pass from the lymph streams into the blood. The disease is transmitted by mosquitoes (culex, anopheles). Formerly it was believed that the mosquitoes did not transmit it directly, but that the filarial larvæ became liberated on the death of the insect and were then ingested with the drinking water, but recent studies have shown that infection is through the sting of living mosquitoes harboring the larvæ.

Elephantiasis and hematochyluria are common in tropical countries; sporadic cases are met with in the southern part of the United States, and occasionally in the large cities of the North.

Treatment (hematochyluria). Drugs are of very little value in the treatment of filarial hematochyluria. The disease lasts many years, with intermissions. Methylene blue (1 gr. several times a day), sandalwood oil, and ichthyol have been used with but indifferent results. Wherry and McDill (*Jour. Infec. Dis.*, June 24, 1910) have employed the *x*-rays after thorough cinchonization of the patient; the same treatment was used with fair success by Wellman and Adelung (*Jour. Amer. Med. Assoc.*, April 23, 1910). The latter gave enormous quantities of quinine; the first day 15 grs., second day 60 grs., third day 70 grs. The next

day 70 grs., then 60, 50, 60, 30, 50, 50, 50, 30, then for five days 15 grs. daily. The quinine was administered in 5 gr. capsules, usually one or two at a dose. Five *x*-ray treatments were given, two before the quinine was started and three after its administration had been begun. The duration of the exposure was one minute, forty-five seconds, thirty seconds. Under the treatment the hematuria ceased, and the embryos greatly diminished in the circulating blood, but did not entirely disappear.

Elephantiasis. In the acute attacks rest and sedative lotions are indicated. Castelanni (*Brit. Med. Jour.*, October 21, 1908) injects daily for a period of three or four months, with occasional intermissions, from 2 to 4 c.c. of fibrolysin (thiosinamin) into the gluteal muscles and wraps the leg firmly with flannel bandages.

Case VI, Figs. 3, 4, and 5.—Mrs. K. L., aged thirty-eight years, U. S., H. W., admitted to Albany Hospital May 4, 1911; discharged May 29, 1911.

Diagnosis. Elephantiasis, right leg, non-filarial.

Treatment. Operation; wedge-shaped pieces removed.

Personal History. Patient married at eighteen; mother of two boys, alive and well. Complains of "enlarged leg."

Family History. Excellent; no history of tuberculosis, cancer, rheumatism, heart or kidney trouble.

Past History. Patient had measles and mumps; never had typhoid fever, pneumonia, or suffered any traumatism; menstruated at fifteen; painful and regular; normal in amount and lasting three to five days. Bowels constipated; appetite good; weighs about 140 pounds, 125 when married.

Present Trouble. Began about fourteen years ago with sharp pains in limb above knee. Somewhat swollen at the time, but did not begin to enlarge very much until five years ago. Patient thinks it began to enlarge all over, not any particular region enlarging more than others. Does all of her own housework, which tires her considerably, and she becomes very nervous.

Measurements. Around foot, nine and one-half inches; around ankle, eighteen and one-half inches; below knee, fifteen inches; around knee, sixteen inches; above knee, seventeen and one-half inches; middle thigh, twenty-one and one-half inches; top of thigh, twenty-three and one-half inches.

This case was carefully studied by Dr. Ordway, of the Bender Hygienic Laboratory, and his assistants. Several examinations of the blood were made, at various times during the night, but no Filaria Bancrofti found.

Operation. Extirpation of three portions of wedge-shaped pieces of tissue, one over anterior aspect of lower third of leg, transversely, just above ankle, and two over posterior lateral aspect, each wedge corresponding to points of greatest redundancy. Very slight bleeding. Tissue blanched and edematous in appearance, with apparent partial thrombosis of bloodvessels. Slight bleeding points tied with cumol catgut ligatures. Two rubber tubes inserted for drainage.

The report on the surgical specimen from Bender Laboratory, received May 8, 1911, from the Albany Hospital, in the case of Mrs. K. L., is as follows:

Gross Examination. The specimens consist of two large elliptical masses of thickened skin and subjacent fat and fibrous tissue; these measure respectively 25 cm. by 4.5 cm., and 23 cm. by 4 cm., and the combined weight is 450 grams.

The skin is rough and furrowed, and has, in general, a "puckered" or shrivelled appearance, as if it had contracted after stretching. From its under surface dense fibrous strands invade the subjacent fat. The entire subcutaneous tissue, including the fat and fibrous tissue, is pale and has a general homogeneous, glassy, or "mucoid" appearance. The fat is of very light yellow color.

Fragments are removed from various portions of these specimens, fixed in 10 per cent. formalin and Zenker's fluid.

embedded in celloidin and paraffin and stained by the hematoxylin and eosin and eosin-methylene blue methods.

Microscopic Examination. The subcutaneous lymphatics are abundant and markedly dilated and all the tissue elements are widely separated by edema.

The epidermis is, in places, slightly atrophic and shows moderate keratosis. At the junction of the epidermis and subjacent tissue the former has a toothed or comb-like appearance as if drawn away from the latter. The cells of the sweat glands are swollen and the cytoplasm is pale and granular.

The subcutaneous fibrous tissue shows marked separation of the collagen fibrils by edema.

The intrinsic smooth muscle fibers of the skin are separated and swollen. The subcutaneous fat appears small in amount as the vacuoles are encroached upon by the swelling and fibrillation of the connective tissue between the fat globules.

There are scattered ill-defined foci of lymphocytes and plasma cells, with occasional polymorphonuclear leukocytes and tissue mast cells. In places these accumulations of cells are distinctly perivascular.

The smaller bloodvessels and capillaries stand out prominently in contrast to the loose (edematous) connective tissue surrounding them, in a way similar to those in the umbilical cord and chorionic villi. The coats of the arteries are thickened, the muscle fibers are swollen and separated; between them are "vacuole-like" spaces. The adventitia is fibrillated and the intima is irregularly thickened. In places the endothelium is shrunken and shows a varying degree of degeneration. The bloodvessels contain but few corpuscles.

The lymphatics are abundant and markedly dilated and occasionally there is a break in the continuity of the wall as if it had ruptured. Many of them are empty, others contain pinkish-granular (edema) and spicule-like material (fibrin), and in still others are lymphoid cells in varying numbers.

This patient made an excellent recovery; however, on the fifth day she had a rise in temperature, and there developed a marked inflammation of the internal saphenous vein which yielded to treatment, causing no serious complications. The absolute rest, elevation of leg, and operation resulted in the limb being nearly the size of the other when she left the hospital. Since then the few reports regarding her case have been favorable. Her case was a typical one in appearance, careful laboratory examination showing it to be non-filarial, and the operation illustrates (more than any other point in the study of these cases) the comfort that comes to the operating surgeon, and the importance of having careful bacteriological and pathological tests made by competent experts.

The diagnosis then having been made, the treatment of today would consist in a thorough examination, regarding the possibilities of any organ presenting a pathological condition, or outside etiological factors producing lymphatic changes. Proper attention should be paid to all the functions of the body; the surroundings of the patient; relieving the patient of any malnutrition or imperfect assimilation of food; the use of hot baths, elevation of the limb; the application of bandages; absolute rest, so far as possible; employment of the *x*-rays, with cinchonization, and various forms of electricity; Castelanni's treatment by means of thiosinamin (fibrolysin); the operation of lymphangioplasty; sterilized silk thread, subcutaneously employed, and the destruction of the fly and mosquito elements that may be present. In the various surgical operations one must pay special attention to the technique, and avoid infection. The veins as well as the arteries should be carefully ligated, and, as in the case of Mrs. K. L., thorough drainage must be provided. The danger of hemorrhage must also be carefully considered.

All therapeutic agents failing surgical intervention becomes proper, such as ligation of arteries, incisions that may

result in a lymphorrhea, longitudinal incision, especially of the arm, in case of tense, lymphatic edema is of service, and, finally, the operation of Rogers', of India, for removal of wedge-shaped, elliptical portions of the hypertrophied tissue.

This, to the writer, promises better results than more serious surgical intervention, in the way of removal of all the tissue, as has been done by some surgeons in India, but the results do not seem to have been very favorable.

DISCUSSION

Dr. Rudolph Matas, of New Orleans, La.—Responding to the call of the reader of the paper to relate our Southern experience, I will say that elephantiasis is one of the tropical types of disease which is always interesting to Southern practitioners, though the filarial or strictly tropical type is practically unknown among us in Louisiana, on the Gulf Coast and South Atlantic States. We occasionally see manifestations of filariasis such as chyloceles and chyluria, but not the typical lymphatic elephantiasis which is so peculiar to the tropics and East Indies. The Filaria immitis, or dog filaria, is extremely common in the canine species in the South, but the human filaria is very rare and is usually imported from the West Indian Islands, south of us. None of the observers in Charleston or Mobile, where the first observations in American filariasis were made known by Guiteras, de Saussure, W. Mastin, and others, refer, to my knowledge, at least, to the elephantiasic type of filarial parasitism.

We have a great many opportunities for the observations of tropical and semitropical diseases in New Orleans, and now that a school of tropical medicine and hygiene has been established in connection with the Tulane University, we are always on the lookout for parasitic elephantiasis. We have our share of non-parasitic elephantiasis both among the negroes and the whites, but these are sporadic cases due to connective-tissue hypertrophy following mechanical obstructions in the lymphatic and venous tracts of the lower extremities, following ulcers of the legs and other causes of a surgical character. There is,

however, a peculiar type of elephantiasis which deserves attention, though it is not peculiar to our Southern Country. It is a specific elephantiasis form of disease which is associated with recurrent erysipelatous attacks, but differing from typical erysipelas in the fact that the eruption never extends above Poupart's ligament and is always followed by a permanent hard doughy edema of the extremity which increases steadily with every erysipelatous attack. It is to this type that the name of elephantiasis streptogenes has been applied by Unna, of Hamburg. It is to this type that the name elephantiasis nostras (Unna) should be applied. The streptococcus, which is the pathogenic organism, closely resembles the Fehleisen coccus, but evidently must differ from this. The attacks are initiated by a red rash which beginning at the toes and foot rapidly spreads up the limb to the thigh. The eruption is accompanied by chills and high fever which may remain at 104° or over for several days, rarely lasting more than a week or ten days, the patient recovering with the disappearance of the eruption. The limb enlarges with each attack. At first the attacks occur at long intervals, perhaps twice or three times a year, then once a month, rarely oftener, each time the limb grows larger, until in the course of time a distinct elephantoid state is fully established. It is a recurrent infection of a latent type, the organisms probably remaining dormant in the tissues after each attack; natural immunity is not easily acquired and once the erysipelatous habit is established the disease will remain permanently grafted to the body.

I recall a lady who came on a visit from Washington to New Orleans several years ago and who sent for me during one of these attacks. She had a marked elephantiasis of the entire lower extremity up to her thigh. She did not have a typical Barbadoes leg which always suggests a monstrosity, but her leg was large enough to be an unsightly deformity. Within a few days the erysipelatous attack subsided and with the hope of preventing further attacks, I suggested a systematic trial of a polyvalent antistreptococcic serum, to be given in doses of 10 c.c. at least three times weekly hoping that the polyvalence of the serum might cover the particular streptococcus which causes the disease. She subsequently wrote me that after applying sixteen injections, she enjoyed a long interval of peace. After another attack she took sixteen more injections, after which the attacks grew much less frequent and much milder.

When the attacks occur the temperature seldom rises high and the swelling has not increased. The disease appears to have been attenuated so much since she began the antistreptococcal injections and she has grown so much more confident in her ultimate recovery, that she has married.

In dealing with hard lymph edema such as is observed in the upper extremity after the extirpation of axillary glands for cancer of the breast, Sampson Hadley's suggestion to create new lymph channels is worthy of consideration. In a recent case of hard, permanent edema of the lower lid, resulting from an injury in the neighborhood of the eye, the huge edema of the lid gradually subsided after the introduction of sterile threads into single incisions which crossed the borderline of the edematous patch and the normal skin. It is now several months since this proceeding was tried, and the edema has practically subsided. This is only one of several applications of what appears to me to be a very valuable suggestion.

Dr. Vander Veer (closing).—In my paper I referred to the method of treatment by the introduction of silk threads, and much that I omitted in reading is referred to there. I am glad Dr. Matas elaborated the erysipeloid form of infection.

THE TREATMENT OF PYELITIS

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In discussing the treatment of pyelitis it is essential that we consider briefly at least the causes of this disease.

The following classification will serve to recall most of the conditions under which pyelitis may occur.

Class I. Inflammations of the kidney pelvis not associated with infection.
- Drugs: Turpentine, lead, mercury, cantharides, alcohol, cubebs, urotropin, etc.
- Exposure to cold.
- Use of too strong solutions in irrigating the kidney pelvis.

Class II. Infections of the kidney pelvis due to an underlying urinary tract disorder.
- Tuberculosis of the kidney.
- Calculus in kidney or ureter.
- Tumor of kidney.
- Floating kidney with ureter kink.
- Malformation of the kidney pelvis.
- Stricture of the ureter.
- Obstruction of ureter from without.
  - Tumors.
  - Cysts.
  - Inflammatory disease.
  - Pregnancy.
  - Appendicitis.
  - Prolapse of pelvic organs.
- Cystitis.
- Prostate enlargement.
- Stricture of urethra.

Class III. Infections of the kidney pelvis in which this is the chief or sole lesion of the urinary tract.

Pyelitis of pregnancy.

Pyelitis of puerperium.

It is probable that pressure on the ureter, displacement by the developing uterus, toxemias, infections of the bladder and of the blood stream play varying roles in these.

Pyelitis during or following the acute specific fevers.

Pyelitis due to appendicitis

It is probable that some of these are due to juxtaposition of the appendix and ureter, the adherent appendix causing inflammatory swelling of the ureter mucosa, stasis of the urine, and infection by direct extension or by way of the general circulation and kidney. Some cases are probably due to hematogenous infection without preliminary ureter involvement.

Postoperative pyelitis—low vitality, anesthesia nephritis, and hematogenous infection.

Pyelitis due to intestinal disorders.

Only the infectious forms of pyelitis are under consideration. Those cases belonging to Class I are generally of non-infectious character, of short duration, and usually involve the kidney parenchyma as well as the pelvic mucous membrane.

Certain of the infectious pyelitis cases are also eliminated from this discussion on treatment, because the pyelitis in these cases is secondary to some other condition which calls for treatment before permanent results can be expected in treating the pyelitis.

This elimination includes most cases belonging to Class II. If the calculus has been removed or the ureter stricture overcome by dilatation or by ureterovesical anastomosis above the site of the stricture and if the pyelitis still persists, its treatment then becomes a matter for consideration.

A pyelitis persisting after any nephrotomy operation may be subjected to treatment, although the results will be more or less successful according to the involvement of the kidney parenchyma.

It is now a well-established fact that the kidneys under

varying circumstances of health and disease include in their function the excretion of bacteria from the system.

L. S. Dudgeon, in his Erasmus Wilson Lecture on "Acute and Chronic Infection of the Urinary Tract Due to the Bacillus Coli" (*Lancet,* London, 1908, vi, p. 615), reports:

Urines examined	Result
20 normal individuals.	No organism found.
20 constipated individuals.	B. coli present in 2; no urinary symptoms.
20 cases of peritonitis.	B. coli present in 4; of these the urine was clear in 2, and 2 had bacilluria. In many a white staphylococcus in urine.
45 pregnant women.	B. coli in 9; no urinary symptoms. In many a staphylococcus and in a few the B. proteus.

Pyelitis probably always requires for its inception some other factor than microbial invasion. The more common of these contributing factors are urinary stasis from any cause, fever, toxemia, and trauma. We are all familiar with cases of aseptic stone kidney. Such kidneys are undoubtedly traumatized, as shown by the resulting fibrosis and lipomatosis. They also undoubtedly perform their function of picking bacteria from the blood and passing them on in the excretions. Yet as astonishing as it may seem it often takes still further contributing factors to determine a true pyelitis or permanent infection of such a kidney. This ultimate or real determining factor may be the lodgement of a small stone in the ureter, causing urinary stasis; or it may be the incidence of one of the acute infectious fevers such as typhoid, pneumonia, scarlet fever, or tonsillitis, in which the high temperature may be detrimental to the kidney tissues, or as is much more probable the resistance of the tissues is lowered by the circulating toxins of these diseases. Again in these diseases the kidney may be overwhelmed because of the great number and the virulence of the bacteria it is called upon to excrete.

As one views this very complicated chain of conditions that may be linked in the determination of a pyelitis it becomes evident at once that it is most illogical to undertake the treatment of a pyelitis without a most minute investigation of its cause.

For a pyelitis following typhoid or pneumonia one might keep his patient in bed for weeks on forced water and antiseptics by mouth, then turn him over to the cystoscopist for added weeks of the more active treatment by pelvic lavage, only to find eventually that the patient needed a surgeon to remove a stone which was the original factor in determining his pyelitis.

In my own list of 26 cases of probable pyelitis I have found certain interesting data relating to the causes of this disease, although this report is concerned primarily with the treatment. You will note that I speak of "probable" pyelitis cases for it is not always easy or possible to separate a pyelitis from a pyelonephritis. The presence of casts and of an unusual quantity of albumin indicates involvement of the kidney parenchyma and many of our true pyelitis cases show this involvement in the early stages.

As stated above the most common groups of pyelitis cases are excluded from this list because their successful treatment calls primarily for activities directed elsewhere than at the kidney pelvis *per se*.

In the last analysis there are comparatively few cases of pyelitis which we may regard as pure catarrhal inflammations of the kidney pelvis due to an infection, and unassociated with some mechanical, traumatic, toxic, or chemical predisposing factor.

It seems illogical to exclude pyelitis associated with stone in the ureter and to retain a group of cases occurring with stricture of the ureter, or a group due to appendicitis. In each of these classes the successful treatment of the pyelitis depends upon a preliminary treatment of the associated condition. In the appendicitis cases the pyelitis

Illustrating congenital intrarenal division of the pelvis in Case III.

subsides promptly if the patient is placed at rest and given treatment (either medical or operation) that controls the acute inflammatory condition of the appendix.

In both the stone in the ureter and stricture of the ureter groups we usually speak of the ureter condition as primary, although it must be recognized that the pyelitis may have antedated and have been the cause of the ureter condition.

We must likewise bear in mind that the primary effect of stone in the ureter or of stricture may be to cause a simple hydronephrosis which later becomes infected and may then be called a pyelitis, an infected hydronephrosis, or a pyonephrosis, according to the degree of dilatation and inflammatory reaction in the individual case.

I am including the pyelitis cases due to appendicitis and those due to stricture because these conditions are less common than those due to stone and as yet have not been extensively dealt with in the literature.

Case I.—Cause not determined. Mrs. H., St. Agnes' Hospital, May, 1908. My private records show that both kidneys were catheterized and yielded pus and a colon bacillus culture. The urine contained slightest trace of albumin, no casts, no tubercle bacilli found on three different days. The hospital notes with records of treatment have been lost.

Case II.—Pyelitis associated with interstitial nephritis. Mrs. V., aged twenty-five years, 1903. Former left nephrotomy for pyelitis and nephrectomy on right side for tuberculosis. More or less constant pain on left side aggravated by a recurrent colon bacillus infection of the pelvis which could be eradicated by a few irrigations of 1 to 1000 silver nitrate solution. Patient finally died of uremia.

Case III.—Pyelitis of left kidney and one year later pyelitis of right kidney due to congenital malformation. Recovery after lavage treatment. Miss M. M., aged ten years. Seen January 27, 1911, at the Union Protestant

Infirmary in consultation with Dr. Henry B. Thomas. The patient was said to have had an attack of typhoid fever in August, which lasted several weeks. For the two or three months preceding the patient's admission to the hospital she had had repeated attacks of pain in the left side accompanied by chills and fever. At all times since the supposed attack of typhoid there had been considerable tenderness in the left kidney region. The patient had been in the hospital for two or three weeks before I saw her, and a Widal test had been negative, and a culture taken from the bladder was pronounced by Dr. Chas. Simon, either a colon or a paracolon. Daily observation of the urine showed a most interesting cycle of changes. From a comparatively normal-looking clear urine the daily specimen showed an increasing cloudiness for about five days, when the urine would suddenly become clear, and the patient at this time would have an attack of severe pain in the left kidney region accompanied by chills, fever of 102° to 103°, nausea, loss of appetite, and great tenderness in the left kidney region. The child was thin and I could palpate the kidney during these attacks, and found that it was not greatly increased in size. For this reason I made a probable diagnosis of an infection of one calyx rather than of the entire pelvis and that this calyx probably had a long slim neck which became entirely shut off when the urine reached a high degree of infection.

After the attack there was an absence of a sudden large increase in the amount of pus as occurs after the entire pelvis has been shut off and suddenly overcomes its point of obstruction.

On January 27 the child was given ether, and through a No. 6 Kelly cystoscope I passed a No. 5 catheter into the left kidney and washed the pelvis with two ounces of 1 to 3000 silver nitrate solution, and followed this with one ounce of salt solution. The child being under anesthesia and not able to warn me when the pelvis of the kidney

was under pressure, I did this washing with a filter funnel under a pressure of three feet elevation.

On February 2 the same treatment was repeated under ether anesthesia, using a No. 7 speculum. On February 11 the patient begged to have the treatment without being anesthetized. I had been urging to have her submit to this and all subsequent treatments were carried out without a general anaesthetic.

The kidney was washed with 1 to 3000 silver on five occasions between January 27 and February 22, when the urine was found free of pus and culture on slant agar was negative.

She was catheterized in my office on March 23 and March 30, with the same negative results on each occasion.

On September 21, 1911, the father wrote that the child had enjoyed good health up to August, when she had an attack of typhoid fever, and since then had occasional attacks of chills and fever similar to those of the previous year, but that the pain was now located in the right kidney region instead of the left. On my advice she was brought to the hospital and a chart kept by a trained nurse was brought to show "that she actually had had typhoid fever." This chart shows that for five days in August her temperature ranged between 102° and 104.5° and then within two days fell to approximately normal, where it remained for two weeks, and then for one day reached 103°, again reaching normal within forty-eight hours, and after four days going to 103° on two successive days.

After reaching the hospital on October 13, the same phenomena of intermittent attacks of chill, fever, and pain were noticed as during the previous hospital visit one year before, except that the pain was confined to the right kidney region. She failed to give a Widal reaction, and a pure culture of colon bacillus was obtained from the urine. This attack of right-sided pyelitis was complicated by a colon bacillus cystitis.

Between October 13 and November 4 the right kidney was washed with 1 to 1000 silver nitrate solution on six different occasions, the urine being free from a colon bacillus growth after the fifth treatment. The bladder had likewise healed under irrigations of 1 to 1000 silver on every second or third day.

An *x*-ray picture (see photo) of a collargol injection of the kidney pelves shows a beautiful outline of a congenitally deformed pelvis on the left side. The right side picture was a failure due to the child warning me that her pelvis was full before the collargol had reached the kidney. Inasmuch as these congenital defects in the kidney are usually bilateral it is probable that the right kidney has the same intrarenal division of the ureter and that in each case the kidney was predisposed to infection by the long narrow calyx necks.

Case IV.—Mrs. H. Acute monolateral nephritis due to sudden exposure to cold after working over a hot cook stove. The nephritis was followed by pyelitis. Two weeks in bed; medical treatment; recovery.

Case V.—Pyelitis right kidney, probably postgonorrheal in character. Mrs. C., aged thirty-three years, March, 1908. Urine from kidney shows considerable pus; is negative for the tubercle bacillus and for organisms of any kind. No growth on slant agar. Bladder symptoms began eight months previously, together with pain in the pelvis where a thickened right Fallopian tube is found. About the time that symptoms began the husband had been treated for the return of an old prostate inflammation. With the foregoing data it is probable that the patient had had a gonorrheal cystitis and pyelitis from which the organisms had died out leaving the inflammation of the kidney pelvis.

Treatment. Three irrigations of the kidney with 1 to 1000 silver nitrate freed the urine from pathological elements and relieved the pain in the kidney region.

Case VI.—Post-typhoid pyelitis, double. Miss V., aged forty-six years, November 16, 1910, referred by Dr. T. R. Brown. The patient, a nurse, had typhoid fever at seventeen years and again at twenty-seven years of age. Since the first attack of typhoid she has had symptoms in the left kidney region. Examination shows the left kidney pelvis dilated to a capacity of 40 c.c. Markedly purulent urine from either kidney and a pure culture of typhoid isolated. The patient's chief complaint was incontinence of urine. This was corrected after three dilatations of an indurated urethra and applications of 3 per cent. silver nitrate. The urine showed about ¼ volume of pus and epithelial cells. The bladder mucosa was normal. The patient promised to return for lavage of the kidneys.

Case VII.—Postoperative pyelitis, double. Miss S., aged twenty years, referred by Dr. R. Warren Ramsay, Delta, Pa. Drainage of immense abscess in pelvis and lower abdomen, probably due to appendicitis. During convalescence on the seventh day the patient began to complain of pain in the bladder and frequency of urination and the urine contained pus. On the thirteenth day she had a chill and sudden rise of temperature to 103°, and complained of pain and soreness in both kidney regions. The kidneys were enlarged and tender. On the seventeenth day a similar attack with chill and temperature reaching 104°. The urine had an abundance of pus in spite of forced water drinking and urotropin.

On the thirty-fifth and thirty-sixth days and again on the fifty-fourth day there were temperature elevations to 102° with pain and tenderness in the region of the right kidney only. The patient was frail and exceedingly ill on admission to the hospital, but was discharged well at the end of ten weeks. One week before dismissal a catheterized bladder specimen showed a few leukocytes.

Intestinal Group. Case VIII.—Pyelitis, acute double, associated with gastro-intestinal irritation. Mrs. M., aged

fifty years. Admitted to Church Home February 2, 1909. Extremely neurotic and almost deaf. Difficult to get a consecutive history from patient. Complains of severe bladder symptoms and fever following a recent attack of diarrhea. Urine catheterized from bladder contains much pus and about 0.1 per cent. of albumin.

Cystoscopy. Bladder normal—both ureter orifices puffy, edematous, and red. Catheterized specimen from each kidney shows considerable pus, no casts, many epithelial cells. Several examinations for tubercle bacilli negative. Slant agar culture showed colon bacilli in pure culture.

By careful diet and free water drinking the kidney condition cleared spontaneously within two months. The patient was followed for several months because of a urethral caruncle, and the urine always showed a trace of albumin.

Case IX.—Repeated attacks of bladder trouble once or twice a year for five or six years, usually associated with "gastritis attacks." Mrs. C., aged fifty-two years, referred June 19, 1911, by Dr. N. E. B. Iglehart. The present attack began about June 1, as a frequency, pulsations in the bladder, and sudden stoppage while voiding. About one week later hematuria of marked grade began, together with an intense pain in the right flank and down the line of the ureter.

A specimen of urine catheterized from the bladder showed about one-third volume of heavy white precipitate. In this were some epithelial cells, many leukocytes and about one red blood corpuscle to ten leukocytes. There was a heavy ring of albumin. Repeated examinations for tubercle bacilli were negative. Röntgen ray and wax tip catheter examinations were negative for stone. There was a colon-like growth on slant agar. This organism was not carried to other media for identification. The bladder walls were trabeculated and showed intense cystitis.

Catheterized specimens from each kidney showed considerable pus, more from the right than from the left side.

The urine spurting from right ureter looked bloody before catheterization of the ureter. The patient was on a restricted diet and drank freely of water and came to my office once or twice a week for washing of right kidney with 10 c.c. of gomenol oil, this oil being left in the bladder. On July 20, one month after the first visit, the bladder appeared almost clear of inflammation. A catheterized specimen of urine showed many pus cells, a few red blood corpuscles, and only a trace of albumin.

The right kidney specimen showed no pus, many red blood cells (trauma?); cultures from the bladder and kidney were negative. On August 10 the patient had only slight bladder irritation, which was probably due to a persistent chronic urethritis, which cleared up entirely somewhat later. The urine was free of pus and blood and showed but a faint trace of albumin, which still persists.

Some of her previous "bladder attacks" had been associated with hematuria and pain in the loins, and I think it fair to assume that these were pyelitis attacks. As near as I could judge from the history and from this last attack her pyelitis attacks follow a gastro-intestinal disturbance and are probably favored by the presence of albumin in the urine.

Case X.—Pyelitis, left kidney, cystitis, following gastro-intestinal attack, with cardiac complications. Mrs. J., aged forty-three years, referred by Dr. Thomas McCrae, August 30, 1911. Patient had gastro-intestinal attack early in the summer, and after this eight weeks ago began to have pain in left side with frequent and painful micturition. A few days later had chills, sweats, and irregular fever. Had heavy dull pain in the left side, and Dr. Floyd McRae, of Atlanta, said kidney was much enlarged. She was very ill and in bed for three weeks. At present very little or no pain in the left kidney. The kidney is easily palpated and is tender. There is no pus in the urine, but it shows a trace of albumin and a few casts, and cultures

from both bladder and left kidney show colon bacillus infection. The bladder shows many vesicles (dilated lymphatics) situated along congested vessels. After three washings of the left kidney with 1 to 1000 silver nitrate and bladder irrigations of the same strength silver solution the colon bacillus infection was eradicated.

Cystitis Group. On seeing a patient with both cystitis and pyelitis it is by no means certain which of the two processes is primary. Pyelitis is not infrequently initiated with cystitis symptoms, and at this early period cystoscopy may reveal a normal appearing bladder, whereas later when kidney symptoms become manifest the cystitis may have developed.

The following two Cases, XI and XII, are reported as pyelitis following cystitis, although as just pointed out the sequence of infection may have been in the reverse order, or in each case the pyelitis and cystitis may have arisen simultaneously and from the same underlying cause.

Case XI.—Cystitis signs and symptoms followed by trauma and the development of signs and symptoms of pyelitis of the right kidney. Mrs. B., aged fifty-three years, seen with Dr. Jeffries Buck, November 10, 1908. Ten days previously Dr. Buck was consulted because of bladder symptoms. He saw the patient each day for a few days, during which time her temperature was normal and the urine showed a decreasing amount of pus.

Five days ago the patient fell down stairs. Within twenty-four hours she had a chill and a temperature of 103° F. She has had fever each day for the five days, the temperature today at 4 p.m. being 102°.

She has had more or less backache since bearing her five children, the youngest of which is sixteen years of age. There have been no special symptoms in the back with this attack.

Examination shows the right kidney to be rather prolapsed, somewhat enlarged, and quite tender. There is

marked tenderness where the ureter crosses the pelvic brim. The urine catheterized from the bladder is turbid, slighty acid, shows specific gravity of 1015, slight albumin on boiling, no sugar. A settled specimen shows a relatively small amount of precipitate. Centrifugalized this shows many epithelial cells, many pus cells, a few red blood corpuscles, a few hyaline casts, many pus and epithelial casts, and many rod bacilli. A specimen examined for tubercle bacilli is negative.

The patient was kept in bed a few days on liquid diet and rapidly improved.

Six weeks later she came for cystoscopy. She had had more or less constant bladder symptoms of a mild grade and some pain in the back. The bladder was slightly congested. The urine looked clear, was acid, and free from albumin. Microscopically there were a number of epithelial and pus cells, but no casts. At a later examination the urine was normal.

Case XII.—Cystitis symptoms two years. Ulcerative cystitis. No special symptoms of pyelitis. Double pyelitis. Miss M., aged twenty-five years, referred December 19, 1910, by Dr. Martin B. Tinker of Ithaca, N. Y.

Two years previously the patient's bladder symptoms began suddenly as a great frequency and desire to void. Pain across the bladder region began one week later. There soon developed partial incontinence. Blood in varying amounts has been seen at intervals since the beginning. At times there has been burning with the act of voiding. She gets up from three to six times at night. At times there has been a "muscular soreness in the loins," no more on one side than the other. From the delicate appearance of the patient and from this sudden onset without known cause of bladder symptoms, which had persisted for two years in spite of treatment, I felt certain that the patient had tuberculosis of one or both kidneys.

Cystoscopy revealed a linear area of ulceration sweeping

around the posterior bladder mucosa like a horseshoe with the heels almost touching in the vertex of the bladder. The left ureter orifice was contracted, and opened in what was apparently healed scar tissue. The right ureter orifice stood wide open, showing a diameter of 3 or 4 mm., and the white ureter mucosa could be seen for a distance of 1 cm. up the ureter.

Several catheterizations of the kidneys showed small amounts of pus from either side with a trace of albumin but no casts. Persistent search for tubercle bacilli on six different days was negative. The patient's bladder symptoms improved rapidly on instillation of gomenol oil, 20 per cent., and after a month of investigation and treatment she was sent to her home in South Carolina, with instructions to lead an out-of-door life, drink freely of milk and water, and take the bladder instillations of gomenol oil. She returned for investigation in November, 1911, when the bladder showed but one small point of ulceration and both kidneys were secreting normal urine.

Appendicitis Group. See Hunner, "Acute Pyelitis Due to Acute Appendicitis," *Jour. Amer. Med. Assoc.*, 1908, l, p. 1328. The three cases of this group, Cases XIII, XIV, and XV, are reported in detail in the above paper.

Case XIII.—Pyuria and hematuria following attacks of appendicitis. Miss R., aged twenty-six years, referred by Dr. Julius Friedenwald in December, 1904. For ten years attacks of severe pain in the right side with more or less constant pain in the right kidney region. The severe attacks began as a throbbing in the rectum and ended with pain in the right kidney region. With some attacks there has been pain in the bladder, and in some vomiting occurred. In several attacks large quantities of pus and blood were found in the urine. I saw the patient about two weeks after a severe attack and the urine was normal. The *x*-ray and wax-tipped bougie examinations were negative for stone. Exploratory investigations of kidney and ureter

were negative for stone. The appendix was found hypertrophied and inflamed and densely adherent over the ureter as it crossed the pelvic brim. Removal of the appendix resulted in permanent relief.

Case XIV.—Acute pyelitis due to acute appendicitis. Ectopic pregnancy probably due to appendicitis, causing kink of Fallopian tube. Mrs. M., aged twenty-nine years, wife of a California physician, while visiting in Berlin in 1906 was taken with a frequency of urination lasting eight hours. Then a sudden severe pain began in the right kidney region and extended forward and down into the pelvis. Large tender mass in the right kidney region. Temperature 103.5° F. High temperature one week. In bed two weeks. Large amount of pus in a bladder specimen of urine.

I saw the patient five weeks after this first attack and a few days after a lighter attack which she had on shipboard on her return trip to America.

The urine then contained a few blood corpuscles and many epithelial and granular casts. After a rest in bed of twenty-four hours the urine examination was negative.

Operation. Removal of appendix showing subacute stage of inflammation. Removal of right tubal pregnancy. No further attacks of "cramp colic" or of pyelitis.

Case XV.—Acute pyelonephritis due to acute appendicitis. Miss L., aged nineteen years, referred by Dr. E. R. Strobel with a letter from Dr. S. E. Maynard of the Mary Fletcher Hospital in Burlington, Vermont.

See the article above mentioned for Dr. Maynard's letter with my later findings which make it entirely probable that this was a case of pyelitis with involvement of the parenchyma due primarily to acute appendicitis. Operation was not done. Spontaneous recovery.

Tonsillitis Group. See Hunner, "Chronic Urethritis and Chronic Ureteritis caused by Tonsillitis," *Jour. Amer. Med Assoc.*, 1911, lvi, p. 937.

I have classified the pyelitis cases associated with stricture

of the ureter under the tonsillitis group, for, as will be seen by the analysis of the cases, it so happens that they all show a suggestive "tonsillitis-rheumatism" or "tonsillitis-pyelitis" history. Case XIX is the only one reported under this group who had no stricture of the ureter, but she had a marked stricture of the urethra which in all probability was not due to gonorrhea.

The first two cases of this group, Cases XVI and XVII, are reported in detail in the above paper.

Case XVI.—Repeated attacks of kidney colic due to hydronephrosis, infection, and inflammation, following stricture of the ureter. Tonsillitis attacks, rheumatism, stricture of both ureters. Miss H., aged twenty-six years, referred in September, 1910, by Dr. H. F. Derge, of Eau Claire, Wisconsin.

Six or seven years previously the patient had an attack of pneumonia, which was followed by tonsillitis and rheumatism. At that time her tonsils were treated with the cautery. Soon after this she began to have attacks of pain in the left flank region. At first these attacks occurred every two or three months and the patient would lie down and flex the left leg for an hour or two until the attack disappeared. Her attacks gradually became worse, but she never had any nausea or vomiting with the attacks until the spring of 1910.

In February, 1910, she had an attack of tonsillitis and rheumatism, followed by similar attacks in March and April. After this the attacks of pain in her side became much more severe and were accompanied by nausea and vomiting. On attempting to catheterize the kidneys I found that both ureters were obstructed near the bladder, although the patient had had no symptoms referable to the right side. Being unable to catheterize and dilate the left ureter from the bladder end I made an extraperitoneal inguinal incision and found that the ureter had an area of scar tissue narrowing throughout its broad liga-

ment region. I opened the ureter at a point about 5 cm. above the crossing of the uterine vessels and then had no trouble in passing gum-elastic filiforms and finally a large follower 7 mm. in diameter into the bladder.

About five weeks later there was again evidence that the stricture had contracted, and, being unable to dilate it from below, I operated through my former incision expecting to sever the ureter and implant it into the bladder. I found so much inflammatory tissue about the ureter that I abandoned this plan and tied off the ureter in order to bring about atrophy of the kidney. After a few days of fever and pain in the kidney region the patient became more comfortable and returned home within four weeks. A recent report says she has occasional pain in the left side when getting very tired, but soon recovers after rest, and has not required medical attention since returning home.

Case XVII.—Pyelitis, right kidney, stricture of right ureter, attacks of kidney colic, tonsillitis, rheumatism. The second case of stricture of the ureter ascribed to tonsillitis was that of a colored woman, aged forty-eight years, who had been under my care in the cystoscopic dispensary for several weeks. She began to have bladder trouble in May, 1910. She complained of a frequency and burning and thought she had caught cold in the bladder. For two years she had had mild attacks of pain in the right kidney region. These occurred from one to three weeks apart and she had no discomfort in the side between the attacks. Since the bladder trouble began in May she thought that the attacks of pain in the side had been more frequent and more severe.

About the same time that the pain began in the side she had a bad attack of inflammatory rheumatism in the left knee. This lasted all winter. Off and on for three or four winters she had rheumatism under the left shoulder blade and in the cervical vertebræ, this at times keeping her from work. She noticed for two years previously that she caught

cold very easily and had a sore throat even in the summer time.

Examination of the urine catheterized from the bladder showed a moderate number of pus cells. The right ureteral orifice was slightly inflamed, presenting such a picture as one sometimes observes when a stone lies low in the ureter. On four different weekly visits I attempted to pass a wax-tipped catheter to the right kidney, being successful only on the second visit. The wax tip returned without scratch marks. On injection of the kidney pelvis her pain-phenomena in the right kidney region were imitated. The pelvis was but slightly dilated, holding but 12 c.c. of fluid. The point of obstruction to the renal catheter was located about 3 cm. from the bladder orifice of the ureter. *X*-ray examination of this region was negative.

The patient's tonsils were both considerably enlarged and she has promised to have them removed.

Case XVIII.—Acute pyelonephritis right kidney; staphylococcus aureus infection; pyelitis left kidney; stricture of both ureters; tonsillitis. Mrs. R., referred by Dr. Chauncey Scudder, March 24, 1909. The patient had been bleeding profusely from the urinary track for two days and was almost exsanguinated. Cystoscopy revealed a large blood clot projecting from the right ureter. Right nephrotomy with drainage. A section taken from the kidney for microscopic examination showed multiple abscesses of the kidney. Several months after recovery I began washing the right kidney to see what this treatment would do toward the reduction of the large amount of pus in the urine. After a few washings the catheter began to be obstructed at about the pelvic brim, and as this obstruction became more marked, and in view of the fact that the patient seemed in perfect health and was not having symptoms, I discontinued the treatments.

On November 17, 1910, or about twenty months after the operation, the patient came complaining of a severe

pain in the left ovarian region. A small mass was felt in the broad ligament region, which I considered either a tender adherent ovary or a large stone in the lower end of the ureter. Investigation with a wax-tipped catheter revealed the fact that this ureter was also the seat of a stricture, the catheter obstructing at a point 13 cm. above the bladder. Tampon treatment of the left ovary soon relieved the pain of which the patient was complaining and another attempt to catheterize the left kidney was a failure.

I had never been able to get at the etiology of the first attack of pyelonephritis and of the stricture of the ureter on the right side; and now on finding a stricture of the left ureter and having had experience with the above Cases XVI and XVII, I questioned the patient concerning tonsillitis. She said that as a child she had much tonsil trouble, with great swelling of the neck and very sore throat. She at first stated that she had had no recent tonsil trouble. She then suddenly remembered that she had a bad attack on March 4, 1909, and was prevented from attending Taft's inauguration on that day because of the tonsillitis This was about two weeks before the onset of her kidney hemorrhage.

Case XIX.—Acute pyelitis, left kidney; chronic urethritis with stricture; enlarged tonsils; past history of tonsillitis. Mrs. K., aged thirty-one years, I-para, aged five years. Patient referred March 4, 1910, by Dr. Lilian Welsh.

For two or three years more or less "bladder irritation." About four weeks ago began to have frequency, scalding, and straining, and after a few days called Dr. Welsh because of blood in the urine. She was kept in bed for about ten days on liquid diet, especially water and milk, and had urotropin. She improved rapidly and for about three weeks she had been about the house. On Thursday, March 3, extreme pain in the left kidney region began for the first time. I saw the patient March 4, when she was suffering with great pain and tenderness in the left kidney region,

and much pain in the bladder and urethra. She had had fever at times since Dr. Welsh had first attended her four weeks previously. For three days under my observation the temperature ranged as high as 102° F., showing rapid fluctuations. She had enlargement and tenderness of the left kidney, tenderness of the ureter as it crossed the pelvic brim, and tenderness over the base of the bladder. The ureter could not be palpated through the vagina. The urine was turbid, due mostly to a colon bacillus bacteruria. A centrifugalized specimen showed a considerable number of epithelial cells, many leukocytes, and about one red blood corpuscle to 50 leukocytes. She had been on forced liquid and there was but a slight trace of albumin.

With rest in bed, the usual routine of liquid diet and use of urotropin, the patient made a rapid and complete recovery.

She dated her first backache from the time she had cared for her five-year-old daughter during a tonsillectomy at the hospital. The patient had suffered two attacks of tonsillitis before her marriage, but had not been conscious of tonsil trouble since. The tonsils projected somewhat above the fauces but did not appear inflamed.

Case XX.—Stricture of right ureter; right hydronephrosis infected with Staphylococcus aureus; urethritis, rheumatism; tonsillitis. Mrs. P., aged twenty-six years, IV-para, referred October 16, 1911, by Dr. Naylor of Pikesville.

On July 2, 1911, and for each succeeding month, the patient had suffered a severe attack of pain in the right kidney region. These four attacks had each occurred immediately preceding her menstrual periods and caused her physician to think the pain might be due to some ovarian condition, although he considered the attacks to be more like stone in the kidney. Each attack had required several hypodermics of morphine, usually amounting to a grain, before relief was obtained.

A specimen of urine catheterized from the bladder con-

tained an excess of epithelial cells, no pus, no blood, and a faint trace of albumin. On the following day I catheterized the right kidney with a wax-tipped bougie, expecting from the history to find evidence of stone in the right ureter. An obstruction was met about the pelvic brim. This was passed with considerable difficulty. The kidney and ureter above this obstruction were found to contain 40 c.c. of salt solution, when an attack exactly similar to her former attacks was brought on. Thirty cubic centimeters returned from the kidney, and by having the patient take the upright position on her knees and withdrawing the catheter tip to the point of obstruction, a steady stream of urine came from the dilated ureter until 10 c.c. more were recovered. The urine did not contain pus. The wax tip on withdrawal was not scratched. An *x*-ray examination was negative. Two dilatations with a wax bulbed renal catheter gave complete relief of kidney symptoms, and within a week after the first dilatation the hydronephrosis had shrunken from 40 c.c. to 15 c.c.

The patient returned November 21, 1911, complaining of rheumatism in the left shoulder. Before this I had considered that her ureter obstruction might have been associated in some way with an operation I had performed four years previously for appendicitis, and I had neglected to inquire about the tonsils. On having her appear with the complaint of rheumatism the tonsil association was at once suggested, and on inquiry I found that she had suffered with throat trouble at times for eight years. She had been gargling for a week past or during the time of her rheumatism.

Examination showed both tonsils greatly enlarged, the left tonsil reaching almost to the uvula.

Dr. Sanger removed the tonsils later and reported them extremely large and riddled with pus foci. She is now having kidney irrigations in an effort to eradicate the staphylococcus infection.

Pyelitis of Pregnancy Group. During my hospital service ten to fifteen years ago I saw a number of cases of pyelitis of pregnancy. Most of these recovered quickly under treatment by rest in bed, liquid diet, heat applied to the loins, and the simple remedies usually applied in such cases. A small percentage had abortion performed because of the persistence of the pyelitis and conditions apparently threatening life. At about the time I left the hospital service in 1902, Dr. Kelly and his associates were beginning to use lavage of the kidney pelvis for this condition and in view of our experience since that time and of the extensive experience of Pilcher (*Practical Cystoscopy*, Saunders Co., 1911, p. 290), I think it is safe to say that few or perhaps none of these cases will require abortion in the future unless it be for complications other than the kidney infection.

In my private practice but two of these cases have been referred to me.

Case XXI.—Pyelitis right kidney, mitral stenosis marked grade, chills, high fever; lavage of kidney on two occasions with decided benefit. Refusal of further treatment. Death about two weeks later. Mrs. S., aged twenty-two years. Seen with Drs. Hamburger and Dobbin, July 12, 1909. The patient was five months pregnant, and nine days previously she began to complain of pain in the right iliac region. In the meantime she developed pain and tenderness in the right kidney region and had chills and a fluctuating temperature, going as high as 104° F. The urine showed pus, blood, and casts. The patient had a serious mitral stenosis and it was thought that interference with the pregnancy might prove disastrous. On July 12 I catheterized the right kidney and obtained thick, purulent, creamy looking urine. The pelvis was washed with 60 c.c. 1 to 3000 silver nitrate solution followed by 15 c.c. boric solution.

On July 15 I repeated the treatment, the urine catheter-

ized from the kidney on this visit was of amber color and of far less purulency. The temperature on the day of the first treatment remained high but on the two following days it was much lower. The patient was extremely nervous and refused further treatment and death resulted in two weeks.

Case XXII.—Four months pregnancy. Acute pyelitis, right kidney associated with acute appendicitis. Appendectomy. Medical treatment of the pyelitis and recovery. Mrs. L., aged twenty years, referred April 2, 1910, by Dr. Frank C. Eldred, of Sparrows Point. The patient had been married five months and was four months pregnant when she was taken with severe pain in the right side, fever, chills, nausea, and vomiting. Dr. Eldred found much pus in the urine and sent the patient to the hospital as one of pyelitis of pregnancy. The signs and symptoms all pointed to the existence of a pyelitis, but there were definite evidences of appendicitis as well. I therefore operated and removed an acutely inflamed appendix, and during the patient's convalescence she was kept on appropriate general treatment for pyelitis, the result being a prompt recovery.

Puerperal Group. For several reasons this is a particularly interesting group of pyelitis cases. In the first place the patients show a fairly uniform and typical symptom complex. Second, this symptom complex is often misinterpreted. Third, if the condition is undiagnosticated and fails to clear up with the treatment which is usually aimed at the bladder symptoms it tends to become chronic and causes ill health out of proportion to the urinary signs and symptoms.

Within three or four days to two weeks after delivery of the child the patient has a sudden chill and temperature elevation and begins to complain of bladder symptoms. There may or may not be definite pain in the kidney regions, and if there is no marked pain the true condition is often

overlooked. The patient is sometimes treated for weeks or months for cystitis when careful cystoscopy would show the bladder to be normal, and more careful history taking and examination would show evidence of trouble in one or both kidneys.

It is particularly at the time of the chills, which recur with intervals of days, weeks, or months, that the kidney is most tender even if there is but slight spontaneous pain in this region.

It should be remembered in this connection that an uncomplicated cystitis is rarely if ever the cause of a marked temperature elevation.

Case XXIII.—Recurring attacks of pyelitis left kidney over a period of ten months. Permanent relief after two lavage treatments. Mrs. W. H. H., referred by Dr. Finney September 15, 1908. Baby born May 16, 1908. Was catheterized for the first ten days by a most careful nurse.

The first chill and fever about two weeks after the baby was born, accompanied by pain in the left lumbar region. This attack lasted two or three days and similar attacks had occurred about every two weeks until I saw the patient four months after the birth of the baby.

The patient was in Atlantic City about two weeks before I saw her and Dr. Durand saw her in an attack and considered it one of pyelitis and placed her on urotropin.

The patient insisted on having ether if any kidney examination was made, as she had been told by some friend that it was a most painful procedure. I therefore went to her home with assistants, had her anesthetized and made a thorough cystoscopic examination. The bladder appeared normal, also the right ureteral orifice; the left ureteral orifice was drawn far back in the bladder, showed a narrow opening, and had scarred-looking mucosa about it. A few small opaque bodies, either edema of the mucosa or possible tubercles, were seen about the orifice. A wax-tipped catheter was passed to the left kidney and the patient was turned

to the dorsal position and allowed to come from under the influence of ether. The bladder was washed and urine was collected through the bladder from the right kidney. Only 1 c.c. was secreted very slowly and a drop at a time from the left kidney in one-half hour. Through the catheter from the bladder 15 c.c. was collected in the same time. On withdrawal of the catheter from the left kidney there were no scratch marks and a plug of mucus was found caught in the eye of the catheter. This may have accounted for the slow and small secretion from that side. The urine from the left side showed many leukocytes and epithelial cells. That gathered through the bladder showed many epithelial cells, a few leukocytes (probably from the left side), and a few red blood corpuscles. The albumin ring showed about 0.1 of 1 per cent., which may have been due to the ether. Slides made from either side were stained for tubercle bacilli, with negative results.

Inasmuch as this patient was leading a fairly normal life except at the time of her pyelitis attacks I advised her to come to my office and have kidney irrigations. This she refused to do and wished me to give her anesthesia and wash the kidney at her home. I refused to make such a surgical procedure of what might be a simple matter and she continued to have occasional attacks of pain, chills, and fever, keeping her in bed a few days at a time during the next six months.

On Thursday, March 11, while attending a bridge party, she was taken with a severe attack and came to my office four days later willing to submit to my advice. I passed a small catheter, No. 5, and irrigated the kidney with four syringe barrels of 15 c.c. each of silver nitrate 1 to 3000, and washed this out with one syringe of 15 c.c. saturated boric acid solution. When I told the patient that she might get down from the table she asked me in a surprised tone if I was not going to do anything for her that day. The urine catheterized from the bladder was very turbid and

contained a considerable number of leukocytes and myriads of bacteria. A culture taken from the kidney showed a pure growth of Bacillus coli.

The patient returned in one week and reported that she had some backache on the day of the treatment and the day following. The urine catheterized from the bladder was less turbid than on the day of the first treatment. No culture was taken this day. On April 5, two weeks later, the patient had her third treatment. The urine catheterized from the bladder was clear, and a culture taken from the kidney on this third visit, or after the first two treatments, was negative. I made a note that either the two injections of 1 to 3000 silver had cleared up the infection or the focus of infection in the kidney was walled off. Two days after this third treatment I had my suspicions that the infection may have been walled off confirmed by a phone message from the husband saying that the patient had had chilly feelings the night before and that her temperature was then 101°. This, however, proved to be a typical attack of la grippe and when the patient came to me on April 19, two weeks later, the urine catheterized from the bladder was absolutely normal, and a culture taken from the bladder was negative. She reported about one month later, on May 13, and said that she was still having some backache, which seemed to her lower than her former kidney backache, and a thorough examination of the catheterized urine showed this to be normal.

Case XXIV.—Recurring attacks of pyelitis for five months. Permanent relief after two lavage treatments. At about this same time, or on February 11, 1909, Dr. Chas. E. Ziegler, of Pittsburg, Pa., wrote me concerning a patient who began to have cystitis symptoms three months previously on the twenty-second day of her puerperium. The patient was a primipara, twenty-six years of age, highly neurotic, had suffered for years from intestinal indigestion, having at times enormous quantities of indican

in her urine. Her appendix was removed by a New York surgeon in February, 1905, and found perfectly normal appearing. In October, 1907, a Boston surgeon had operated for a retroverted, adherent uterus, freeing adhesion, and doing a ventral suspension after the method of Kelly. Three months after the last operation she became pregnant and Dr. Ziegler had charge of her confinement. After a stormy pregnancy she was delivered on October 28, 1908, of a nine-pound boy. The labor had to be terminated by low forceps operation on account of exhaustion. A considerable laceration of the perineum and vagina could not be repaired for forty-eight hours on account of her condition. A good result was secured and at the end of seven weeks the uterus was fully involuted and in excellent position.

After the delivery of the placenta the bladder was full and the uterus failed to contract. Dr. Ziegler catheterized the patient personally under the strictest aseptic precautions. The patient was not catheterized again, as she voided freely and easily.

"On November 17, the twenty-first day after labor, the urine was cloudy for the first time and the next day there were present the first symptoms of cystitis, frequent micturition, with moderate pain following the act. For the following week the patient had a slight evening rise of temperature, 99° or 100° daily, with a normal morning temperature. The urine showed a tremendous amount of pus and a corresponding amount of albumin, both of which diminished rapidly under formin, grs. 30, daily, and washing out the bladder daily with boric acid solution. The urine at present is at times absolutely negative both chemically and microscopically. It suddenly and at intervals of days at a time becomes cloudy and filled with pus. Except for the first twenty-four hours the patient has had very little in the way of subjective symptoms, the only thing being some tenderness back of the symphysis and a distinct lameness at times over the region of the kidneys. This lameness the

nurse assures me is followed within twelve hours by the cloudy urine containing pus as above described." Dr. Ziegler felt that he had exhausted the usual lines of medical treatment and asked my advice about cystoscopy and the investigation of the kidneys. He wrote that the patient was gaining in weight and had no constitutional symptoms, but in view of her nervousness and worry he was anxious to have the case cleared up. I wrote him advising that he continue with the formin and large quantities of water, and advised the use of the ampules of gomenol oil, as this was being lauded by some of the European urologists for infections of the urinary tract. The patient failed to improve, and she came to Baltimore on April 19, 1909, and cystoscopic examination, cultures, etc., showed practically the identical condition found in Case XXIII except that it was the right kidney which was the seat of the pyelitis. The same treatment as in Case XXIII resulted in a complete disappearance of pus and bacteria from the kidney and bladder after two treatments.

Case XXV.—Pyelitis right kidney, four years; recovery after eight lavage treatments. Mrs. C. S., wife of a physician of Santa Cruz, California, aged thirty-six years. Married eleven years. II-para—both dead. Menstrual periods regular, twenty-eight-day type, three days flow, always exceedingly painful, often passes membranes.

Her first child was born seven years ago, this being an eight and a half pound child, born with one continuous pain and the theory was that the child died of asphyxia. The second child was born four years ago, labor being induced at the end of the eighth month because of the onset of uremic convulsions. Albumin had been discovered at the end of three and a half months because of fainting spells. At the time of this induced labor the patient was catheterized once by an incompetent nurse and about the third day after the childbirth cystitis symptoms developed. In less than one week there was pain in the right kidney region.

For the intervening four years the patient has had practically no relief from pain and soreness in the right kidney region. This has been exaggerated by walking or riding, and especially by any occupation requiring the use of the right arm, such as writing. During this four years there have been intermittent signs of pyelitis. The patient has had pus in the urine at all times and on occasions has passed blood and gravel.

There has been a strong family history of tuberculosis, and in 1900 the patient lived out of doors because of cough, hemorrhages, and loss of weight. Tubercle bacilli were not found.

Examination. There is tenderness in the right kidney region, the kidney on deep inspiration being easily felt and showing no special enlargement. There is tenderness on pressure over the ureter at pelvic brim. Vaginal examination of the ureter shows no enlargement but some tenderness.

Cystoscopy. The bladder is slightly congested; both ureter orifices look normal. The right orifice is rather small, admitting a wax-tipped catheter only after two efforts. The wax-tipped catheter returned negative for stone. Injection of the kidney shows the pelvis to hold but 7 c.c. of urine. The patient says the pain caused is in the same region as her former pains, but this injection pain is sharp in character as contrasted with the dull pain usually suffered.

The urine catheterized from the bladder shows a fine turbidity, and a small precipitate is composed of epithelial and pus cells. There is about 0.1 per cent. of albumin. The urine catheterized from the right kidney shows considerable blood (trauma), rather more leukocytes than from the bladder, and many rod bacilli, mostly in chains. A slant agar culture shows colon bacillus.

Between March 2 and April 13 the kidney was washed with 1 to 1000 silver nitrate solution on eight different

days, the patient showing a steady improvement, and at the end of this time the urine was free from bacteria and pus. The urine still showed about 0.1 per cent. albumin.

On April 24 cultures were taken from each kidney and proved negative. A culture from the bladder still showed a free growth of colon bacilli. The patient stated that she was free from pain in the right side and that there had been no suggestion of tenderness in the last seven days. She had written more letters in the last three weeks than in the previous four years. She has been walking as much as she wished. For four years her menstrual periods have caused great pressure in the right kidney region, but there has been none of this with the period just finished.

On July 1 the patient wrote from California that she was "a new woman." "The one difficulty now is that with eating and sleeping so much better there is either a prospect of letting out the seams in my gowns, or being reduced by some of the anti-fat remedies."

Case XXVI.—Pyelitis both kidneys, four weeks after labor; motile rod bacillus (colon?); excessive secretion of pus; recovery on medical treatment. Mrs. S., aged thirty-seven years, wife of a physician in Waynesboro, Pa. I was called to see the patient when the youngest of her five children was five weeks old. One month before her labor she had cystitis symptoms which lasted one week. Four weeks after delivery the cystitis symptoms again began with urination every few minutes, accompanied by sick feeling and nausea and a pain across the kidney regions. The symptoms were so severe that the patient had been in bed for three or four days when I first saw her. She had been on forced water drinking and cystogen, grs. 5, three times a day. The urine examination showed an unusual quantity of pus, about 0.1 per cent. of albumin, acid reaction, many rod bacilli, mostly in chains, and an occasional red corpuscle. There were no casts, and the urine was

negative for tubercle bacilli. Both kidneys were enlarged and painful and the ureters were painful at the pelvic brim region and as they entered the bladder. Cystoscopy showed only slight congestion of the bladder, and purulent urine was seen pouring from each ureteral orifice.

The patient was placed on strict rest in bed under the care of an excellent nurse. She was given liquid diet, hot fomentations over the kidneys, cystogen and a mixture of potassium citrate, and tincture of hyoscyamus. Recovery was complete within a few weeks.

Treatment. The object of treatment is to rid the patient of pain or discomfort and to restore the kidney to the secretion of urine free from pus and bacteria. We occasionally see a patient with monolateral or bilateral pyelitis who seems but little or not at all inconvenienced by the condition; but this is rare, and the rule is that the patient suffers with ill health and discomfort quite out of proportion to what might be predicted from an examination of the urine.

Except in the acute cases (Cases VII, IX, and XXVI) one rarely finds much pus in the urine, and as stated before we find in the acute cases evidence (albumin and casts) that the kidney parenchyma is somewhat involved. In one chronic typhoid case (Case VI) there was excessive pus, but the large capacity of the pelvis would indicate parenchyma injury. The symptoms may be marked (Case X) where only a bacteriuria remains and there is no pus or other evidence of an inflammation. On the other hand the infection may clear up, leaving a persistent inflammation as indicated by pain and the presence of pus (Case V). We often hear clinicians say that there is not enough pus in the urine or not enough bacteriuria to be considered of consequence, but experience teaches that we cannot estimate the degree of ill health or discomfort by the urinary examination, and that we must consider the presence of bacteria or leukocytes in a kidney specimen as evidence of disease.

We cannot consider a pyelitis cured until the kidney urine is free from leukocytes and bacteria.

Most cases of pyelitis clear up under medicinal and hygienic measures, the chief of which are rest in bed, warmth, light and nourishing diet, and free ingestion of fluids. That posture best calculated to drain the kidney or kidneys should be instituted. Counterirritation by the use of the Paquelin cautery, mustard plasters, hot poultices or fomentations, or hot water bags over the kidney, I believe from experience to be of real value. A thick cotton jacket over the kidney regions should supplement the counterirritation. The skin of the entire body should be kept warm and active. The bowels should be well opened, using care in the pyelitis of pregnancy cases not to produce abortion by the use of aloes or other drastic purges. Above all institute a free natural irrigation of the kidneys by keeping the patient on a liquid diet and forcing the amount of ingested water either by mouth, subcutaneous infusion, or by bowel.

The use of antiseptics by mouth is of questionable value.

It is well recognized that balsams such as sandalwood oil are of variable composition, and even when standardized have an uncertain effect on the digestive tract and urinary apparatus of different individuals.

I have noted clinically and taught my pupils for the past ten years that the hexamethylenamin preparations influence the urinary infection in only a small percentage of patients and that it is useless to continue this drug if positive results are not obtained in ten days. During the last year my colleague Dr. C. F. Burnam has been making quantitative estimation of the formalin in the urine of patients taking urotropin. He has found that the drug is broken up and excreted in the urine as formalin in sufficient quantity to be of antiseptic value in only about two cases in ten.

Some patients taking this drug suffer from digestive disturbances and a few have irritation of the urinary tract mucous membranes.

For a number of years we have been taught and in turn have taught that since the colon bacillus is usually found in a highly acid urine, we should place such patients on alkaline drinks. Now Koll, of the Michael Reese Hospital, reminds us that the colon bacillus normally lives in the alkaline medium of the large bowel, and that the urine should be made more highly acid.

Koll ("An Experimental and Clinical Study of Colon Bacillus Infections of the Urinary Tract," *Transactions of the American Urological Association,* 1911, vol. v, p. 94) reports a series of studies with solutions of aluminum acetate in which he used culture tests in the laboratory, animal experiments, and finally clinical observations in cases of pyelitis, cystitis, and urethritis. His conclusions in brief were that liquor aluminum acetate in 2 per cent. dilution is an active germicidal and antiseptic agent to the colon bacillus and the colon group of bacteria; that the germicidal and antiseptic properties are due to the acid radical of the drug, as proved with experiments with acetic acid, and that used in 2 per cent. dilutions it has no deleterious effects on the mucous membrane. He reported seven cases of pyelitis treated by lavage at intervals of from two to five days and the cases all recovering in from two weeks to three months. To increase the acidity of the urine, he gave by mouth after each meal one gram of aluminum subacetate made in one-half grain tablets.

Most cases resisting medicinal and hygienic treatment can be promptly cured by irrigating the kidney pelvis with an antiseptic solution—aluminum acetate 2 per cent. (Koll) or one of the silver salts, argyrol 25 per cent. (Pilcher, "Postural Treatment and Lavage of the Renal Pelvis for the Relief of Pyelitis of Pregnancy," *Surgery, Gynecology, and Obstetrics,* 1910) or silver nitrate 1 to 1000. The solution must be strong enough to act as a bactericide but not of a strength sufficient to injure the mucosa. To insure against injury to the mucosa and consequent increase of pain, the

author has followed the silver nitrate irrigation with a brief flushing with salt solution or boracic acid solution, a precaution that future experience may demonstrate to be unnecessary.

If the pyelitis is dependent upon ureter obstruction of any kind the early removal of this must be planned for, although kidney irrigation may be carried on in the meantime if the obstruction can be passed with a renal catheter. Although the infection and inflammatory signs may thus be eradicated we would not look for permanent results until the obstruction is removed.

The technique or method of applying the lavage treatment has been sufficiently explained under the description of cases and does not demand repetition.

ADDITIONAL CASES OF NEPHROURETERECTOMY AND REMOVAL OF LARGE SUPPURATING KIDNEYS

By George H. Noble, M.D.
Atlanta, Georgia

In presenting these specimens I do not claim anything of special interest concerning them, since the novelty of removing the kidney and ureter in one piece has worn away, but they serve to introduce the subject of removal of large suppurating kidneys which concern us more. These two cases represent the fifth and sixth in which I removed the kidney and ureter in one piece. In quite a number of others the ureters were removed in part or in pieces.

There are several points of interest in the history of Case V. She was a very delicate woman upon whom I operated five and a half years ago for ruptured papillomatous cyst of the left ovary. The papillomatous mass was larger than a grape fruit and secondary growth was scattered over the anterior abdominal wall and intestines. After removal of the mass secondary growths were thoroughly scraped away and cauterized with a thermo-electric cautery. She made a good recovery, but returned seventeen months afterward for removal of a postperitoneal cyst behind the cecum. It was made up of enormously dilated lymph spaces and measured six by eight inches in dimensions. She came back two years and a half later and stated that for twelve months she had had chills, irregular temperature, pain, tenderness, and swelling in the left lumbar region.

At the time of the examination the swelling extended forward and inward from the left hypochondriac and lumbar regions to the median line and downward to the level of the anterior superior spine of the ileum. The temperature curve was characteristic of septic infection, urine loaded with pus, and patient's general condition extremely bad. In digital examination a stone was felt up under the bladder, occupying the position of the lower end of the left ureter. It was clearly a case of pus kidney (from ureteral calculus) engrafted upon hydronephrosis. On account of the extensive dilatation of the kidney and the patient's physical condition, and believing she could not stand drainage of prolonged suppuration incident to removal of stone, nephrectomy was decided upon. The loin incision five inches in length extending obliquely downward and forward was made. The kidney was evacuated, and after some difficulty was delivered through the wound and cut free from its vessels. The ureter was then dissected out by digital dissection and cut off close to the bladder with a long pair of scissors past through the loin incision. The ureteral stump was not ligated.

Case VI gave a history of hydronephrosis from childhood, repeated swelling, pain and tenderness in left side and later copious discharge of pus in urine. Urine was rarely free from it. After growing up to adult life trouble became worse and the distention more frequent with chills and irregular temperature. For the past twelve months the left lumbar and hypochondriac regions have been distended with the mass extending nearly to the median line in front and as low as the anterior superior spine of the ileum. Occasionally the rounded outline would disappear, but on deep palpation a semifluctuating mass could occasionally be felt. A ureteral catheter entered the ureter for about an inch and there met with obstruction. On account of the chronicity of the case and enormous dilatation of the kidney, nephrectomy was done. Considerable difficulty was experienced in dissecting

Fig. 1.—Case V. Nephroureterectomy. Stone in lower end of ureter, 1 x 3 inches, causing obstruction, pyonephrosis, etc.

Fig. 2.—Case VI. Nephroureterectomy. Fibrous band passing over ureter at its entrance into bladder caused Z-shaped kink and dilatation of ureter, pyonephrosis, etc.

the kidney free on account of perinephritis, and for the same reason a second incision in the left iliac region was necessary to separate the ureter from the iliac vessels. Close to the bladder a fibrous band passing over the ureter drawing it sharply downward causing a Z-shaped kink was encountered. The ureter was dilated to this point, but here suddenly reduced to its normal size. The band was broken and a slight portion of the normal ureter separated and pulled out of the bladder walls and cut off with scissors.

Both patients made good recoveries.

For convenience of description I would divide the subject of pyonephrosis into two classes. First, cases due to primary infection of the pelvis of the kidney. Second, pyonephrosis engrafted upon hydronephrosis.

Not infrequently kidneys of the class first mentioned are unnecessarily sacrificed for the lack of careful investigation. I refer particularly to examination of urine for solids in preference to testing permeability with drugs.

When the disease follows hydronephrosis is not so important, for the fact that tissue atrophy occurs and destroys the usefulness of the kidney, especially in chronic cases. Besides this, the history, the large size of the pus sac, and other symptoms elicited by palpation would scarcely justify one in confusing this condition with suppurations originating in primary infection except in rare occurrence. Exceptions are encountered in instances of spontaneous removal of the obstruction to the outflow of urine, large flaccid kidney sacs may collapse so completely that they not only lose their outline, but it may not be possible to detect them by careful palpation even in thin relaxed subjects, and if it should occur on the left side, where the kidney is less accessible, some confusion may arise.

Then it will become expedient to resort first to the well-known method of measuring the capacity of the kidney by ureteral catheterization, and second, by collecting more or less of the outflow for examination for solid constituents of

the urine. Enormous capacity and the absence of urinary solids indicate renal atrophy and dissipates existing doubts.

In pyonephrosis of primary pelvic infection the mass or sac does not grow so large but preserves more or less of the renal contour; palpation, therefore, may lead us to suspect the nature of the case at once. However, smaller capacity of the kidney and the presence of a fair percentage of urinary solids warrants an attempt to save the kidney. In chronic cases the walls of the pelvis may be so thickened from previous attacks that it does not dilate materially but the mass increases at the expense of calices. This gives the kidney a lobulated appearance, indicating atrophy of renal tissue and prompts further investigation. When it is impractical to collect urine from the kidneys separately, preoperative investigation is unsatisfactory. This may occur with kinked or impacted ureters. Dependence then must be placed upon the gross appearance of the kidney. It should be opened extensively (if necessary from pole to pole) and the pyramids inspected. If atrophy has not occurred the kidney may be saved, provided the obstruction can be relieved. Upon the other hand, if the pyramids have atrophied, or if the pelvis is filled with cheesy or inspissated pus and tissue debris masses, it is an evidence of complete blocking, chronicity, and tissue atrophy.

In doubtful cases temporary drainage through the loin incision may be resorted to and urine collected for analysis. If the urinary solids are not present or do not progressively increase as the discharge of pus subsides, tissue atrophy has occurred and the uselessness of the kidney proved regardless of the amount of water constituents of the urine present. A free flow of the latter with the absence of solids indicate functional activity of the cortex and destruction of the pyramids. In such circumstances the cortical portion of the kidney is not only of no service but is positively harmful as a contributing factor to the suppurative process. Upon the other hand, if the functional activity of the

pyramidal portion of the kidney has not been lost and if they show a tendency to increase the output of urinary solids, the kidney may be saved provided the pelvis is neither excessively dilated nor anchored mesial to the peritoneum and deeper tissues by perinephritis. The tendency in such circumstances is the formation of pockets and accumulation of residual urine that may undergo decomposition and become a congenial culture media.

In connection with the above brief outline the general health of the patient and other circumstances must be considered. If the patient cannot withstand prolonged suppuration and discomfort or drainage, a kidney that otherwise might be saved must be sacrificed. Again, perinephritis involving the pedicle, making it rigid and interfering with proper anchorage of the kidney to the loin incision, increases liability to urinary extravasation in extraperitoneal fatty tissue and becomes a complication that may warrant the sacrifice of a kidney that might in other circumstances be saved.

If the colon is involved and its walls softened from intense infection, and safeguarding against extravasation of urine not made secure, it is better to extirpate the kidney because urinary extravasation is liable to result in fecal fistula and death.

DISCUSSION ON THE PAPERS OF DRS. HUNNER AND NOBLE

Dr. Henry D. Fry, of Washington, D. C.—I only wish to say a word or two about the cases of pyelitis occurring during pregnancy. About two or three months ago I was called in consultation to see a woman, seven months pregnant, who had been having fever for some time, and her attending physician had treated her. First, his attention was directed to a dulness in the lung, and he thought she had pneumonia. He afterward settled on a diagnosis of typhoid fever, although a blood examination was negative. He treated her for typhoid fever for three

weeks, and the temperature not going down at the end of that time, he then abandoned the theory, and I saw this woman in consultation, and found there was decided tenderness in the region of the right kidney. I suggested an examination of the urine, and it was reported to be acid, with a quantity of pus, and with hyaline casts and albumin. It was a case of pyelitis of pregnancy. This woman was put on urotropin, water to drink freely, a milk diet, and it quickly passed away. The woman got well, and afterward had a natural labor.

In cases of pregnancy this infection, which is nearly always produced by the colon bacillus, I think comes directly from the blood, as has been mentioned. In some cases I think it may go directly through from the intestinal tract into the urinary tract. It occurs much more frequently in the right side, but just why the right side should be more vulnerable it is impossible to say. It has been attributed to a damming up of the urine in the right ureter from pressure; the occipitofrontal diameter of the child's head being more frequently in the right oblique diameter of the pelvis, it is supposed that pressure of the child's head causes more frequent infection of the right pelvis of the kidney. But that cannot be the cause to any extent, as evidenced by the fact that we have these cases occurring so often in the period of mid-pregnancy, about the fifth month, before the child has developed sufficiently to produce any pressure by its head upon the ureter.

The only point I wish to mention in regard to the treatment is that these cases should not be allowed to run on too long. In the case I spoke of, I was afraid there was some structural injury of the kidney on account of the albumin and casts, but there was not, and the case cleared up under the treatment of urotropin. The point I wish to make is that in these cases of pregnancy it is unnecessary to wash out the pelvis of the kidney in 85 per cent. of them, for they will clear up promptly if you give them urotropin, plenty of water to drink, and a milk diet, and there is no occasion to use any other treatment.

Dr. Hugh H. Young, of Baltimore.—I have been very greatly interested in both of these papers, and the specimens exhibited by Dr. Noble are among the most beautiful I have ever seen.

In the determination of whether we should treat pyelitis in a medical or surgical way, much will depend on what has happened to the kidney. Many cases of pyelitis are associated with perfectly normal kidney, in others the kidneys are partially or

completely destroyed. An accurate determination of the functional value of the two kidneys is of great importance, because, in the first place, the supposedly sound kidney may be partially impaired, so much that it would be quite dangerous to remove the other more diseased kidney which, although far from normal may be contributing an important part in the secretion of urine. Cases of prostatic hypertrophy in which the kidneys have been markedly impaired by back pressure have shown us how it is possible when this obstruction has been removed for these kidneys to regenerate and to become practically normal again. In the course of a few weeks the functional value of the kidneys may improve almost miraculously, and one should therefore be careful in operating upon a kidney, not remove one which may be capable of doing good work and may become almost normal afterward. The first requisite is, of course, to remove the cause of the ureteral dilatation and pyelitis; this may be at the vesical end of the ureter or somewhere along the course of the ureter, and can usually be determined and relieved at operation, or before or afterward.

In one of my cases in which the ureter was found to be at least an inch in diameter, I simply divided the stricture at the lower end of the ureter, and did not remove either the kidney or the ureter; the patient is now entirely well ten years after this operation, thus showing that in many cases it is not necessary or advisable to do a nephroureterectomy, even though marked dilatation of the kidney has occurred.

Although everyone is agreed that nephrectomy is the proper treatment for tuberculosis of the kidney, it is not true that ureterectomy should usually be done; in fact, operators of the greatest experience now think that the ureter should be left, because it is better to have the tuberculosis confined to a fibrous tube than to have it draining into the bottom of a deep wound from the lower portion of the ureter, which is almost surely tuberculous, and which certainly in male individuals cannot generally be removed.

Accurate functional tests to determine the condition of both kidneys are absolutely essential before operating upon cases of this type. In the phenol-sulphone-phthalein test we have now, for the first time, a simple, rapid, and sure method of accurately determining the condition of the two kidneys. After having tried the various functional tests that have been brought out during the last ten years, I have never been satisfied until the

present time with methods of functional diagnosis, and I am so convinced of its great advantages that I usually never think of operating upon a patient without first giving a functional test in order to determine whether the kidneys are sound or not.

After an intramuscular injection of 6 mg. of the drug it is only necessary to pass a catheter into the bladder and collect the urine as it comes from the kidney. As soon as the first faint pinkish color appears the time for the measurement is commenced, and the urine is then collected for one and two hour periods, and carefully estimated by means of a special hemoglobinometer. If the appearance time is greatly delayed and the two hour output is small, an immediate major operation is almost surely contraindicated or at any rate the patient should be put on preliminary treatment until his general condition improves. The test ought undoubtedly to be introduced very largely as a test before general surgical operations are performed because often in this way alone serious impairment of the kidneys can be discovered. It also has very great value as a general medical analytical test, because it is more accurate than the usual urinalysis. We have been able to detect marked impairment in kidneys which the ordinary tests showed to be normal—findings that were proved correct by autopsy. I cannot too highly recommend a general adoption of the "phthalein test."

Dr. Guy Leroy Hunner, of Baltimore.—This interesting subject which has been presented so ably by Dr. Young and Dr. Noble emphasizes the question of the recuperative power of the kidney and what we can do to save it. Given a large kidney in which a stone causes a great deal of destruction of the kidney tissue, we cannot expect much in the way of recovery, but given a case like this we can look for a good deal of recovery upon the part of the kidney.

I operated a year and a half ago on a patient who had a stone at the pelvic brim. I did an extraperitoneal operation, removed a large stone, dilated the ureter below, and she had no further trouble. At that time the phenol-sulphone-phthalein test showed that the left side was doing one-fortieth part of the work. Eight months later, when I operated on the same patient for appendicitis, I had an opportunity to examine the two sides again. The left side was doing one-seventeenth of the work. I made an appointment for another examination. Last month the left side was doing one-twelfth of the work, showing that the kidney is gradually recovering. It was infected before the operation, and

now the urine is clear. Nothing was done for the pyelitis. It has recovered spontaneously.

I have here a beautiful specimen of a large tuberculous kidney. The interesting point is not the size of the kidney, but it is the history of the patient. She has had bladder trouble for six or seven years. Five years ago she had a hysterectomy performed, but it did not help the bladder symptoms. Two years ago she was in a Baltimore Hospital for eleven weeks because of bladder trouble. The interesting point is that in the last two years she has not had any bladder symptoms. Two months after leaving the hospital her bladder symptoms ceased and she has had none since. She could not explain that, nor can I. This kidney was removed ten days ago.

On the same day I removed a tuberculous kidney from a young woman whose history illustrates the typical case of tuberculous kidney. She began with the statement that "up to two years ago I was never conscious of having a bladder. At that time while a graduate student at the University of Chicago I was awakened one night with a desire to void frequently and the urgency was not relieved by voiding. This condition has persisted ever since in spite of many forms of bladder treatment and an operation of suspension of the uterus."

This history was enough to make me feel quite certain that she had tuberculosis of the kidney although she had had no symptoms in the back. On catheterizing the urine from the bladder I was surprised to find only a small quantity of pus, scarcely enough to make slides for staining purposes. I was then inclined to give up the idea of tuberculosis but the slides showed an unusual number of tubercle bacilli. Further investigation showed that only the right kidney and ureter were tuberculous and these were removed.

Dr. Francis R. Hagner, of Washington, D. C.—I have enjoyed both of these papers very much. Speaking of drainage of the kidney, Dr. Young says it is important to find the shape and size of the kidney pelvis. This is very important. It has been my experience that if you have a much dilated kidney pelvis there is no use in trying lavage. I have had no results in the cases that held not over 20 c.c. of fluid.

I recall a case of double pyelitis in a man in which I catheterized both ureters and found a 10 c.c., pelvis on one side, and on the other side a 30 c.c. pelvis. The pyelitis was probably due to a typhoid infection. He had pus in his urine for five or six

years. The right side, after two irrigations, cleared up. The left side, while improved, has not been cured, and he has had three treatments. My experience has been that in these cases you get improvement from irrigation of the pelvis after two or three treatments. If you do not, then there is no use in trying it longer.

Two years ago I reported a case of gonococcus infection in which we obtained an absolute cure. We obtained a pure culture of the gonococcus from one kidney. He was absolutely relieved after a third irrigation with nitrate of silver. I have been using the solution stronger than the doctor suggested, using usually a solution of from one-half to 1 per cent., and not injecting over one ounce. I do not know whether the stronger solution has any greater beneficial effect or not. We have obtained excellent results in cases of pyelitis by this treatment. And most of the cases previous to irrigation of the pelvis have been treated medically without cure.

Recently an idea was brought forward in cases of pyelitis in children to render the urine alkaline. We know very well that the colon bacillus, which is usually the cause of pyelitis, nearly always grows in acid urine, and in children good results have been obtained by rendering the urine alkaline and in that way diminishing the growth of the colon bacillus.

Just a word with reference to large collections of pus in the kidney pelvis. Two years ago a young lady came to me with tuberculosis of both kidneys. The left kidney was enormously enlarged. She came from the country and was in such a precarious condition I was afraid to operate. When I catheterized the ureter leading to the left kidney I found the pus so thick that it would not run through the ureteral catheter. I introduced a long filiform into the ureter and the catheter was threaded over it. I did not have such a cystoscope as Dr. Young has here, but simply introduced a long filiform through the ordinary catheterizing cystoscope and passed it on up to the left kidney pelvis, removed the cystoscope and left the filiform in place. I took a No. 12 Casper catheter and threaded it over the filiform, passing it into the ureteral orifice and by inspecting the ureteral orifice with the ordinary examining cystoscope passed in beside the catheter, I was able to pass the large catheter up to the kidney. I drained nearly a pint of pus out of the kidney. The patient had been running a temperature for two weeks which ranged from 101 to 103, and within twenty-

four hours after the operation it was normal, remaining so for a week when the pus began to collect again. By this time the patient was in fair condition. The kidney was opened and drained. As this patient had tuberculosis of both kidneys I was afraid to remove the bad kidney. She has had a drainage tube in the kidney pelvis for two years and is in fairly good condition.

Dr. Hunner (closing the discussion on his part).—I quite agree with Dr. Fry that the average case of pyelitis of pregnancy does not need irrigation of the kidney. Regarding this woman who died, her case was very obstinate, and she had been under the care of one of our best medical practitioners some weeks before I was called in.

As regards the use of urotropin in these cases, if it does not drive out the colon bacillus in a week or ten days you may as well quit. I have found clinically, and Dr. Burnham has found by quantitative estimation of the formalin in the urine that in only about 2 cases out of 10 does urotropin do any good whatever; that is to say, in only one-fifth of our cases is formalin secreted in bactericidal amount.

Dr. Hagner's remarks relative to the size and shape of the pelvis of the kidney I quite agree with. I think where you have a dilated pelvis of the kidney it is evident that there is something below, and one should not be satisfied without finding what is back of it.

As regards the strength of the silver nitrate, I have found it can be used in a strength of 1 to 500. With a 15 c.c. syringe I use four barrels, or 60 c.c., and I do not leave the silver solution. I use one barrel of boracic acid solution to get rid of the excess silver. When I have given it in the strength of 1 to 500 it has caused pain, so I restrict myself to 1 to 1000 as the strongest solution used.

Dr. Noble (closing).—I think it very bad surgery to leave either a tuberculous ureter or one that has been enormously dilated and converted into the condition of a suppurating pus sac. In either of these diseased conditions infection may have a tendency to extend into the bladder and possibly to the opposite kidney by ascending ureteritis. The specimen presented by Dr. Cullen illustrates the fact that tuberculosis may be latent and show no signs or symptoms even though it exists in more or less serious stage. However, the fact that a tuberculous ureter may not give symptoms for a time does not mean it will permanently remain harmless.

In reference to large suppurating kidneys, the point I wish to emphasize is this, that when practicable the urine from a diseased kidney should be tested for solid constituents to test permeability. This may be used either as a substitute or in corroboration of the phenolphthalein test. But when ureteral catheterization is impracticable the kidney may be drained temporarily and the test applied later.

Before operating settle the question whether the kidney is secreting water or urine or has been converted into a large suppurating pus sac.

UMBILICAL TUMORS CONTAINING UTERINE MUCOSA OR REMNANTS OF MUELLER'S DUCT

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While gathering together from the literature the numerous cases of primary tumor of the umbilicus, I found several that did not seem to belong to any of the classes hitherto recognized, and yet all of these cases in one or more points bore a certain amount of resemblance to one another. Finally the picture of this new group became so firmly fixed in my mind that when reading the description of a case recorded in 1899, by Dr. Green, of Romford, England, I felt so sure that his case came under this category that I wrote him, asking if perchance he still had a section of the tumor. An examination of the slide which he kindly furnished me showed that we were right in our surmise. In brief, the clinical histories in this class of cases, coupled with the gross appearances of the tumors, leave no doubt that we are dealing with a variety of umbilical tumor never before clearly understood.

The composite picture of such tumors—which were found only in women—is as follows: At some time between the thirtieth and fifty-fifth year a small tumor develops at the umbilicus, reaching its full size in the course of a few months. It is usually described as being the size of a small nut. Sometimes it is painful, especially at the menstrual period,

and in at least one instance there was a brownish bloody discharge from the umbilicus at such times.

The overlying skin is usually pigmented, and there may be one or two bluish or brownish cysts just beneath the skin. These may rupture and discharge a little brownish fluid—old blood. On section the nodule is found to be intimately attached to the skin, is very dense, and is traversed by glistening bands of fibrous tissue. Scattered throughout the nodule one sometimes finds small spaces presenting a sieve-like appearance. These spaces are filled with brownish fluid. Occasionally there may be a small cyst several millimeters in diameter filled with brownish contents. Exceptionally grayish somewhat homogeneous areas are distinguishable in the tumor.

On histological examination the superficial squamous epithelium is usually found intact. It may be normal or thickened. The stroma of the growth is composed of dense fibrous tissue. Sometimes a few bundles of non-striped muscle are noted here and there in the fibrous stroma. In other specimens the non-striped muscle is much more abundant than is the fibrous tissue.

Scattered throughout the field are glands, round, oval, or irregular. They occur singly or in groups and are lined with cylindrical epithelium. When occurring singly, they frequently lie in direct contact with the fibrous tissue, but when found in groups, are usually surrounded by a characteristic stroma that stains more deeply, and is much more cellular than the surrounding fibrous tissue. The cells of this stroma between the glands usually have oval or round vesicular nuclei. Frequently some of the glands are dilated and their epithelium is somewhat flattened. The cyst spaces noted macroscopically and filled with brownish fluid are likewise dilated glands and the fluid is old blood. The stroma around the glands frequently shows fresh hemorrhage or remnants of old blood to be recognized by the deposit of blood pigment.

From the above description it is clearly seen that the gland picture is that of the uterine mucosa with its typical glands and its characteristic stroma, and further, that the typical menstrual reaction is often present as evidenced by the pain in the nodule at the periods, the accumulation of old menstrual blood with the formation of small cysts, and in at least one instance by the occasional discharge of blood from the umbilicus. In this case (Fig. 1) one or two of the glands opened directly on the surface, thus allowing free escape of the menstrual blood.

In all nine cases have been recorded. Green's case (Fig. 1), Mintz's first and third cases (Figs. 4 and 7), and Ehrlich's case (Fig. 10) owe their glandular origin without doubt to the uterus or to a portion of Mueller's duct from which the uterine mucosa originally comes. Although the cases reported by Wullstein, Giannettasio, von Noorden and Mintz (Case 2) also probably belong to the same group, the evidence is not quite clear, and without the opportunity of carefully studying the original sections I should not feel justified in claiming with certainty they do.

The most common glandular elements at the umbilicus are remnants of the omphalomesenteric duct. These are usually identical in structure with the glands of the small intestine and never give rise to the cystic dilatations noted in the group of cases under discussion; moreover, hemorrhage into the stroma is exceptional. They differ totally both in their gross and histological appearances.

We have in this group of cases glandular elements that, from their histological appearance and arrangement, correspond exactly to those found in adenomyoma of the uterus, and in one case at least (Green's) the surrounding stroma was composed chiefly of non-striped muscle, making the growth essentially an adenomyoma. In the majority of the cases, however, the stroma consisted of fibrous tissue, little or no muscle being present.

These growths are benign and if removed *in toto*, provided

no other embryonic foci exist, give rise to no further trouble. In Mintz's first case, four years after the first nodule had been removed, two others developed. These were also extirpated.

In Ehrlich's case, in addition to typical uterine mucosa, there was a definite tumor formation that had originated from sweat glands.

In order that the reader may gain a clear insight into each of the cases they are reported in detail, together with the comments on each case. The descriptions of the illustrations naturally differ from those given by the various authors. I have redescribed each picture in the light of our new knowledge of the subject.

A case of umbilical papilloma which showed some activity of growth in a patient, fifty years of age, and which was due apparently to inclusion of a portion of Meckel's diverticulum. By Charles D. Green.[1] [The author very kindly placed a section of the growth at my disposal. There is no doubt that the gland elements in this case are identical with those of the uterine mucosa, as seen from the accompanying illustrations which have recently been made.—T. S. C.]

The patient, a woman, fifty years of age, had complained of irritation about the umbilicus for about two and a half years, and there had been an occasional discharge, brownish in color. When Dr. Green saw her fourteen months before the growth was removed there was some eczematous irritation of the skin in the neighborhood, but no projecting growth could be observed at that time. The bottom of the umbilical depression had an irregular wart-like appearance. The surrounding eczema soon yielded to treatment, but there was from time to time an irritating discharge from the umbilicus, which the patient declared was always worse during her menstrual periods.

[1] Transactions Pathological Society, London, 1899, vol. l, p. 243.

The umbilicus with the growth and a portion of the surrounding skin was removed. The omentum was not adherent to the umbilicus and no intestine was seen at operation. The wound healed by first intention and there was no subsequent trouble so far as could be learned.

On microscopic examination the skin was found to be normal. The stroma of the growth was made up of fibrous tissue and non-striped muscle, scattered among which without any definite arrangement were numerous gland elements. Some of these were very near the free surface, others more deeply placed. They were for the most part tubular, and lined with columnar epithelium showing large deeply staining nuclei. They were thought to be reproductions of Lieberkühn's crypts, but differed from them in their exaggerated dimensions. Some of them were so large that they might almost have been described as cysts. (Dr. Green thought that the growth was a remnant of the vitello-intestinal tract.)

On reading this history I noted that there had been some discharge of blood from the umbilicus as indicated by the brownish color, and, furthermore, that the patient had always been worse at the menstrual periods. This made me suspect the possible presence of uterine glands at the umbilicus. I wrote Dr. Green, and early in July received the following reply:

"The Ferns, Romford, England,

"June 22, 1911.

"Dear Sir: In reply to your query about my case of umbilical growth, I herewith send you a section from the same, so that you may form your own judgment as to its histology. I did not think it was malignant. I last heard of the patient two and a half years after the operation. She was then alive and well. This, I think, shows that the growth was not secondary to an undiagnosed growth within the abdomen. Owing to removal, I have not subsequently

heard of her, so I cannot say what ultimately happened to her. I enclose a copy of my paper which I happened to have kept.

"Yours faithfully,

"CHARLES D. GREEN."

We were particularly fortunate in obtaining this specimen from Dr. Green, in the first place because it was twelve years since the case had been reported and in the second place because it is one of the most valuable cases of this character thus far on record.

Dr. Green's Specimen, No. 125. The skin surface is intact and practically normal, although at a few points the epithelium is considerably thickened. In one or two places, directly beneath the skin, there is a small round-cell infiltration, chiefly in foci. At one point the surface epithelium extends a short distance into a cavity (Fig. 1, *c*). In the lower portion of the cavity the lining consists of cylindrical epithelium, one layer in thickness. Around this area the stroma shows a considerable amount of hemorrhage. It is from this point that there was undoubtedly bleeding at the menstrual periods. The underlying stroma consists, to a large extent, of non-striped muscle. Scattered here and there throughout the muscle are glands. They are small, round, oblong, irregular, or large (Fig. 2). A few of them occur singly and lie in direct contact with the surrounding stroma. The majority, however, occur in groups or in chains, and are separated from the surrounding stroma by definite stroma of their own (Fig. 3), which is recognized by its deeper stain and its abundance in vesicular nuclei which are oval or round. Some of the glands are very much dilated. Where such dilatations have taken place, the surrounding stroma frequently shows a good deal of hemorrhage. Were it not for the presence of the skin surface, one would immediately diagnosticate the specimen as an adenomyoma of the uterus. The picture is typical, as seen

Fig. 1.—A small umbilical tumor containing glands and stroma identical with those of the uterine mucosa. The slide was kindly furnished me by Dr. Charles D. Green, of Romford, England, and is from the umbilical growth reported by him in the Transactions of the Pathological Society of London, 1899. The squamous epithelium is intact and apart from some thickening appears about normal. Scattered throughout the underlying stroma are oval, round, or irregular glands occurring singly or in groups; there are also a few cystic spaces: Some of the glands lie directly beneath the skin. At *C* two of the glands open directly on to the surface of the umbilicus. Area *A* has been enlarged and is shown in Fig. 2. The increased magnification of area *B* is seen in Fig. 3. The photomicrographs of this series were made by Mr. H. H. Hart.

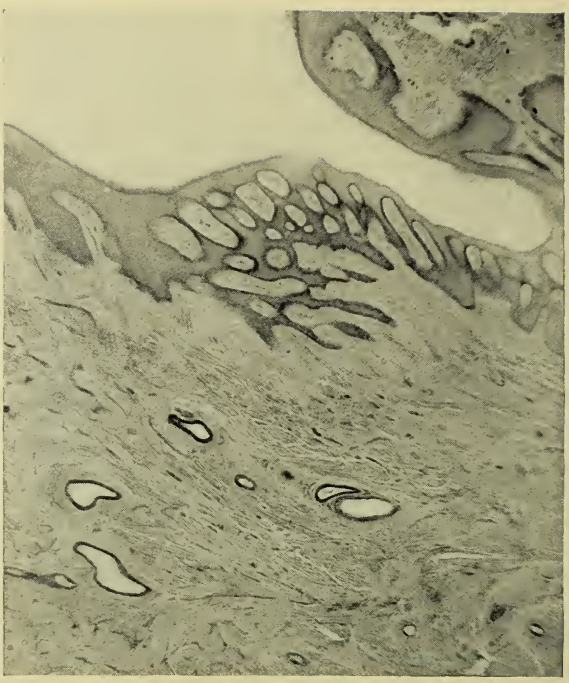

Fig. 2.—Glands from a small umbilical tumor. The picture is an enlargement of the area *A*, in Fig. 1. The normal character of the surface epithelium is clearly seen. The gland spaces vary considerably in size and shape and are lined with cylindrical epithelium. Those in the picture lie in direct contact with the dense surrounding stroma.

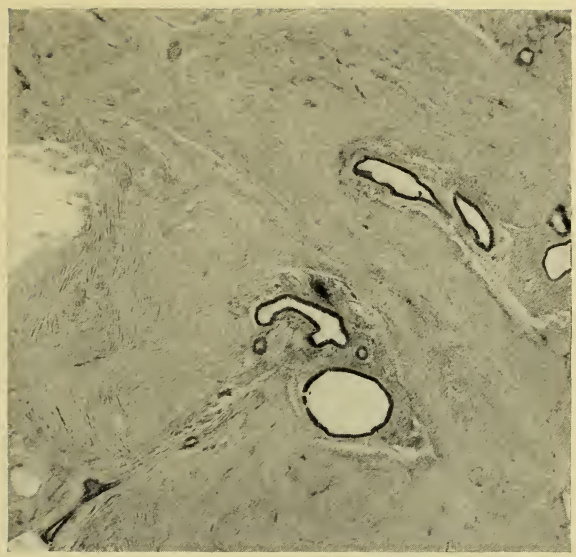

Fig. 3.—Typical uterine mucosa in a small umbilical tumor. An enlargement of area *B* in Fig. 1. The three large glands in the right-hand part of the picture in shape and arrangement resemble those found in an adenomyoma of the uterus; separating them from the dense tumor growth is a definite and characteristic stroma. The group of glands in the middle of the picture is even more characteristic, one of the glands being dilated. All are lined with cylindrical epithelium and the contrast between the surrounding stroma and the dense growth is very clearly marked. As noted in the description non-striped muscle was found scattered throughout the nodule.

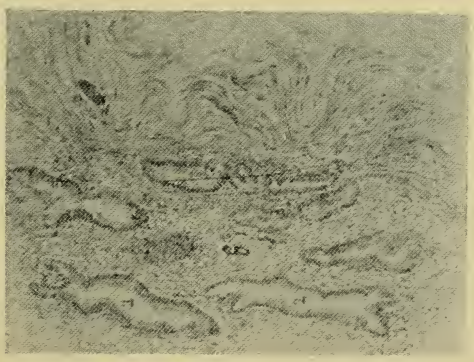

Fig. 4.—Glands in a small umbilical tumor. The outlying connective-tissue stroma is very irregular. Occupying the lower half of the field are glands showing some branching. They are lined with one layer of cylindrical epithelium and lie in a characteristic stroma which separates them from the fibrous tissue of the tumor. The entire picture reminds one to a large extent of adenomyoma of the uterus. W. Mintz. Case I. Archiv f. klin. Chir., 1909, Band lxxxix, S. 387.

Fig. 5.—Dilated glands in a small umbilical tumor. In the centre of the field is a very much dilated gland. Its epithelium is flattened. The gland itself is separated from the surrounding stroma by a definite dark-staining zone. As noted in the history the dilated gland cavities in the tumor contained exfoliated epithelium, granular material, and in some instances blood. W. Mintz. Case I. Archiv f. klin. Chir., 1909, Band lxxxix, S. 388.

Fig. 6.—Dichotomous branching of glands in a small umbilical tumor. The histological picture might very readily be taken for that of an adenomyoma. In the lower part the gland shows dichotomous branching. W. Mintz. Case III. Archiv f. klin. Chir., 1909, Band lxxxix, S. 394.

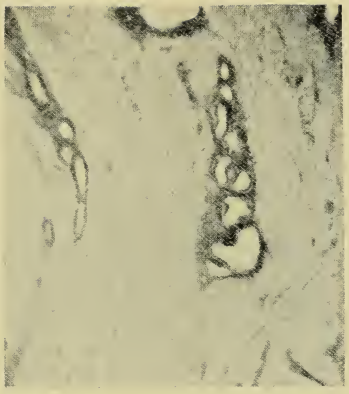

Fig. 7.—Uterine glands in an umbilical tumor. The gland grouping in the picture is similar to that seen in a typical adenomyoma of the uterus. In the colony of glands near the centre of the picture the glands are regularly distributed and are surrounded by a definite stroma which separates them from the matrix of the tumor. The chain of glands in the left upper corner is in part surrounded by stroma, but some of its glands lie in direct contact with the dense surrounding tissue. W. Mintz. Case III. Archiv f. klin. Chir., 1909, Band lxxxix, S. 395.

Fig. 8.—Gland hypertrophy in a small umbilical tumor. Near the centre of the field is a gland showing some hypertrophy. Separating it from the surrounding stroma is a characteristic stroma which stains more deeply and is rich in cell elements. This picture could be used very readily as an example of a uterine gland in the muscle. W. Mintz. Case III. Archiv f. klin. Chir., 1909, Band lxxxix, S. 396.

Fig. 9.—A tumor of the umbilicus composed partly of hypertrophic sweat glands. The glands are gathered into definite groups reminding one of the gland arrangement in small fibromata of the breast. The individual glands bear a marked resemblance to ordinary sweat glands. Some of them are dilated. Another portion of the tumor consisted of typical uterine mucosa (see Fig. 10). H. Ehrlich. Primäres doppelseitiges Mammacarcinom und wahres Nabeladenom (Mintz). Aus von Eiselsberg's Klinik. Archiv f. klin. Chir., 1909, Band lxxxix, S. 746.

Fig. 10.—Uterine mucosa in an umbilical tumor. To the left are characteristic uterine glands, a few of them dilated. They are surrounded by a definite stroma which separates them from the connective tissue. In the right upper corner of the picture are similar glands, the majority of which have become dilated. If we take the lower half of the picture only, it might very readily pass without any description for a representation of an adenomyoma of the uterus. H. Ehrlich. Primäres doppelseitiges Mammacarcinom und wahres Nabeladenom (Mintz). Aus von Eiselsberg's Klinik. Archiv f. klin. Chir., 1909, Band lxxxix, S. 747.

Fig. 11.—A small umbilical tumor containing numerous glands. This is a low power picture of the mass. The growth is covered with squamous epithelium. Scattered throughout the stroma are quantities of glands. In form they bear a closer resemblance to uterine glands than to sweat glands. At one point the glands almost reach the surface. Von Noorden. Deutsche Zeitschr. f. Chir., 1901, Band lix, Fig. 1, Taf. III.

Fig. 12.—Glands in a small umbilical tumor. The glands in the lower left half of the picture bear quite a resemblance to uterine glands. Those in the centre of the field remind one of the pictures seen in the depths of uterine glands, where there is some reduplication of the folds. The gland in the left part of the field is markedly dilated and contains much detritus. Von Noorden. Deutsch. Zeitschr. f. Chir., 1901, Band lix, Fig. 2, Taf. III.

from Figs. 1, 2, and 3. The growth is an adenomyoma of the umbilicus. Dr. Green at the time felt sure that the condition was a rare one, as indicated from a second communication dated Aug. 4, 1911:

"Dear Dr. Cullen: . . . I am glad you found my specimen so interesting. . . . I had some photographs prepared, but the Committee of the Pathological Society did not think them of sufficient interest to insert them in the *Transactions*. I was a little disappointed at the time, for I thought that the condition was uncommon. . . .

"With kind regards,

"Yours faithfully,

"CHARLES D. GREEN."

[On looking up the *Transactions* I found that two of the Committee diagnosticated the growth as a columnar-celled carcinoma, but whether primary or secondary they were unable to decide. The Chairman of the Committee said some of the members present who examined the specimen were not inclined to regard it as malignant. There is little wonder that at that time confusion existed, and had it not been for the specially favorable opportunity I have had of examining so many cases of adenomyoma I should have undoubtedly overlooked the true origin.—T. S. C.]

W. Mintz, "Das wahre Adenom des Nabels" (True Adenoma of the Umbilicus), *Deutsch. Zeitschr. f. Chir.*, 1899, Band li, S. 545.

CASE I.—In 1883 a woman acquired an umbilical hernia after labor. Ten years later, within the space of about two months, a dark blue tumor, the size of a hazelnut developed on the umbilical elevation. This had two cystic areas on its surface. During menstruation the tumor swelled and the cysts ruptured. They contained blood-tinged fluid. The tumor was extirpated and the hernia repaired. This tumor on section presented a cavernous appearance, but no microscopic examination was made. In 1897, four

years later, there was a return of the hernia, and at the umbilicus were two hard nodules about the size of hazelnuts. On microscopic examination they were found to contain glands lined with cylindrical epithelium and surrounded by a definite stroma. Here and there bundles of non-striped muscle were in evidence. The dilated glands contained blood pigment. Mintz thought he was dealing with remains of the omphalomesenteric duct.

[When discussing this case two years ago, just after making the abstract, I made the following note: "The clinical history, the macroscopic appearance, the picture of the glands, the stroma, and the contents of the dilated glands all point to adenomyoma, although adenomyoma of the umbilicus has never been reported.—T. S. C.]

We are fortunate in again hearing from Mintz on the subject. Ten years later he published an article entitled "Das Nabeladenom," *Arch. f. klin. Chir.*, 1909, Band lxxxix, S. 385. Here he describes, more in detail, the histological findings of the same case. He says the ground substance of the growth consists of connective tissue not very rich in cells. They cross one another or run parallel with one another in cords. Here and there in the scar tissue, one sees gland tubules in either transverse or longitudinal section. They are surrounded by young, very cellular connective tissue, which passes very gradually into the old scar tissue. The glands are lined with one layer of cylindrical epithelium. Their lumina are collapsed and contain blood pigment or reddish colored contents (Fig. 4). In some places the tubules lie close, at other points they are separated. The newly formed connective tissue surrounding them has changed into old connective tissue poor in cell nuclei. Some of the glands are dilated and their epithelium is flattened. The lumina appear to be filled with detritus. Here and there the cylindrical epithelium is unrecognizable and the cavity contains blood pigment (Fig. 5). Where the dilatation has occurred, the epithelium has disappeared; in this way

are to be explained the cysts with blood contents which were noted when the patient first entered the hospital. Between the glandular portion of the tumor there are at some points groups of non-striped muscle fibers that have no definite topographic arrangement in relation with the glands. The microscopic examination shows an adenomatous growth in the scar tissue. This has stimulated the growth of the scar tissue and thus originated the young connective tissue surrounding the new glands. In the meantime the periphery of the nodule in the scar has been converted into sarcoma.

After giving this description he says in a footnote that at the time of writing, that is ten years later, the tumor has nevertheless not returned. The explanation of the origin of this tumor he gives as persistent remains of the omphalomesenteric duct which had remained latent for 42 years in the umbilical scar and under the influence of chronic injury (a ten year persistent umbilical hernia) had given rise to adenoma.

[It can hardly be doubted that we are dealing with an adenomyoma, although such a case had heretofore never been described. We have the increase in size at the menstrual period, the cysts with blood contents, glands resembling uterine glands, the characteristic stroma of the mucosa, surrounding the glands that was thought by Mintz to be sarcomatous, and the fact that after the second operation the patient remained absolutely well for ten years. How these glands originated at the umbilicus we do not attempt to explain. We have, however, found them in the inguinal region, and I feel confident that in the course of time somebody will get a clear chain of evidence showing how remnants of the uterus can reach the umbilicus.—T. S. C.]

Mintz. Case II, p. 392. The woman was thirty-eight years of age. Eleven months before a myomatous uterus had been removed through an abdominal incision. Eight months later she noticed at the umbilicus a tumor which

increased in size for three months, and then stopped growing. During menstruation there was pain in the tumor. From the umbilicus to the symphysis there was an operation scar. At the umbilicus was a conical tumor with its base high in the umbilicus. The tumor extended for 2 cm. above the surface of the abdomen and was covered with pigmented skin. During the excision it was noted that this tumor was adherent to the omentum. With the naked eye one could see in it a cavity containing several drops of brownish fluid. Microscopic examination showed that this cavity was lined with epithelium. There were tubular growths and cavities, some more or less filled. By strong magnification one could see that the canals and spaces were lined with cylindrical epithelium. At other points the cavities contained exfoliated epithelium. Around the glands the connective-tissue cells here and there were star-like, and contained large quantities of collagen, suggesting the tissue of the umbilical cord. At other points the connective tissue surrounding the gland cavities showed inflammatory changes. The tubules were dilated and here and there were seen emigrated leukocytes. In some of the connective-tissue cells hemosiderin was visible.

[In this case we are not sure of the exact condition. It reminds us somewhat of adenomyoma, but no mention is made of muscle. It is just possible that the cells surrounding the glands were not inflammatory, but represented ordinary stroma. This, however, is doubtful. The chief points in favor of adenomyoma are that the tumor was painful during menstruation, and that the cavities contained blood or brownish fluid, and, further, that the patient had been operated upon for a fibroid growth eleven months before, and that on histological examination hemosiderin was noted in the stroma.—T. S. C.]

Mintz. Case III. The patient was a woman forty-five years of age. Nine months before she had noticed a harden-

ing at the umbilicus. During the first four months the tumor remained stationary in size, but later it grew and was painful. Then the growth ceased and the pain disappeared. The skin was adherent to the tumor; it was brownish in color and traversing it were slightly dilated veins. The tumor passed in a cone-shaped form into the umbilicus.

The tumor on section was found to consist of firm scar tissue in which numerous small cysts filled with brownish contents were noted.

Microscopic Examination. The connective-tissue portion of the skin passes directly into the connective tissue of the tumor. This consists of parallel and irregular connective-tissue strands, here and there showing small round-cell infiltration. With the low power one sees cavities of various sizes filled with a brownish pigmented fluid. The small round and tubular cavities are partly arranged in groups, partly separated from one another by old scar tissue. The tubules here and there show dichomotous branching (Fig. 6). At several points the growth is seen passing in various directions. At many points where one group of unchanged tubuli exists it is surrounded by young connective tissue which, toward the periphery, passes off into the old fibrous tissue (Fig. 7). The cavities of more recent formation, and the tubuli are lined with one layer of cylindrical epithelium. In the more widely dilated cavities the epithelium assumes a flattened shape. On further dilatation the epithelium becomes still flatter and drops off into the cavities. These cavities are surrounded by connective tissue (Fig. 8). They contain detritus, swollen epithelium, and leukocytes.

[Mintz's various figures are very suggestive, and Fig. 7 could very readily be used by us to demonstrate an adenomyoma of the uterus instead of adenomyoma of the umbilicus. Here we have cross-sections of glands forming a definite colony. This area is surrounded by the characteristic stroma of the mucosa. Fig. 8 could picture a mild

grade of gland hypertrophy of the uterus. It also is surrounded by the characteristic stroma of the mucosa. Although no mention is made of muscle being found in this growth, the glands and the gland branchings are absolutely identical with those of the uterus. In my case of adenomyoma of the round ligament,[1] connective tissue predominated, and there is no reason why in some of these cases also connective tissue should not take the upper hand throughout.—T. S. C.]

On page 396 Mintz gives a *résumé* of his three cases. They developed in women of middle life in the umbilical tissue, and the tumors reached the size of hazelnuts. The growth at first was slow, but suddenly increased after the lapse of several months. Examination of the tumors showed that they were painful. There was an exacerbation (congestion) at the menstrual periods.

In all three cases the microscopic picture showed the growth of tubular glands in the scar tissue of the umbilicus, this glandular growth being accompanied by "granulation tissue reaction." This young connective tissue surrounded the tubular glands and separated them from one another and transformed itself gradually into connective tissue. [This is the characteristic stroma which one normally finds separating the uterine glands from one another.—T. S. C.]

The gland tubules consisted of one layer of cylindrical epithelium, which when the tubules dilated into cavities under the influence of the secretion became flattened. Finally this epithelium disintegrated and dropped into the cavities which contained the albuminous bodies and leukocytes. Mintz thought the tumors originated from remains of the omphalomesenteric duct. He then describes

[1] Thomas S. Cullen. Adenomyoma of the Round Ligament. Johns Hopkins Hospital Bulletin, May, 1896; Further Remarks on Adenomyoma of the Round Ligament. Johns Hopkins Hospital Bulletin, 1898.

an instance of a somewhat similar growth reported by von Noorden in the *Deutsche Zeitschrift f. Chir.*, 1901.[1]

H. Ehrlich, "Primäres doppelseitiges Mammacarcinom und wahres Nabeladenom" (Primary Bilateral Carcinoma of the Breast and True Adenoma of the Umbilicus (Mintz), Aus von Eiselsberg's Klinik), *Archiv f. klin. Chir.*, 1909, Band lxxxiv, S. 742.

The patient was fifty-four years of age and had had no children. She had had an abdominal operation ten years before on account of some uterine trouble. Shortly after leaving the hospital she developed a tumor in each breast, which gradually reached the size of an apple. They caused little difficulty, and in the course of a year did not increase much in size. Simultaneously with the appearance of the tumors in the breasts the umbilicus was pressed upward, markedly by a tumor the size of a hazelnut developing at that point. This growth had remained stationary. The umbilicus had been transformed into a small tumor with pigmented skin. The tumor was hard and was with difficulty pushed over the underlying structures. The umbilical growth and the carcinomata of both breasts were removed. (We are here interested chiefly in the umbilical tumor.)

The tumor of the umbilicus was 3 cm. in diameter. Macroscopically it consisted of a hard, pure white scar-like tissue firmly attached to the skin. Scattered throughout the tumor were a number of pinhead-sized spaces which contained a serosanguineous fluid. Histologically the chief mass consisted of fibrous tissue, poor in nuclei and cell elements. The skin covering the tumor, except that it showed a marked pigmentation of the basal layer, looked normal. The connective tissue of the skin passed directly into that of the underlying tumor. In the tumor were

[1] See also R. Herzenberg. Ein Beitrag zum wahren Adenom des Nabels. Deutsche med. Wochenschr., 1909, Band i, S. 889. Herzenberg evidently describes the same cases as those reported by Mintz.

numerous islands of loose connective tissue which varied markedly in the number of their nuclei, and inside this were epithelial elements. There were two definite histological pictures. In the portion lying near the skin (Fig. 9) were groups of closely compressed and tortuous gland loops lined with large cuboidal epithelial cells having small centrally located nuclei. The gland lumina and the basement membrane of the tubular glands were easily recognizable. Similar glands were also found in the connective tissue. They were undoubtedly hypertrophic sweat glands.

Predominating in the central portion of the extirpated tumor was a second kind of epithelial tissue likewise situated in the loose connective tissue, but exceedingly rich in nuclei. This consisted of tubular glands with high cylindrical epithelium; cilia and goblet cells were not visible. Through the fork-like arrangement of the tubular glands there had originated here and there many bay-like spaces which might be mistaken for papillary formations and which had given rise to cystic formations due to the presence of fluid. Here and there the epithelium of the cystic spaces had disappeared or become flattened. The contents of the cysts were hemorrhagic or showed a formless detritus, and in several places surrounding the cysts were masses of blood pigment. Van Gieson's stain failed to bring out any smooth muscle surrounding the epithelial elements. This was only found in connection with the vessels of the connective tissue, and there not abundantly.

While the glands first described are without doubt hypertrophic sweat glands the glands of the second group are, on account of the character and their epithelium, in all probability derivatives of the intestinal tract. Ehrlich speaks of the growth as an adenoma of the umbilicus.

[The reader will note that, judging from Fig. 9, there is no doubt that the first gland elements described by Ehrlich are sweat glands, and that the tumor consisted of sweat glands. Fig. 10, however, shows everywhere that the second variety

of glands can in no way be connected with remnants of the intestinal duct, but that we have here typical uterine mucosa enveloped in a definite stroma.

The cystic spaces, as noted in the text, were partly filled with blood. They are nothing more than glands that have been markedly dilated by old menstrual fluid. This is one of the cases in which the definite uterine character of the mucosa is clearly evident.—T. S. C.]

L. Wullstein, "Eine Geschwulst des Nabels (Kombination von Cystadenom der Schweissdrüsen mit cavernösem Angiom)" (A Tumor of the Umbilicus Consisting of a Cystadenoma of the Sweat Glands and a Cavernous Angioma) Arbeiten aus dem Path. Inst. in Göttingen. R. Virchow, 50 Doctor Jubiläum, 1893, S. 245.

Wullstein says that in the literature he has found no tumor similar to the one he is describing. In 1891 a specimen was sent to the Göttingen Laboratory. This consisted of an umbilical tumor which had developed in the course of three years, and was attached by a thin pedicle which had not been completely removed. The pedicle had extended into the abdominal cavity. The physician in charge had made a diagnosis of myxofibroma. The patient was a sterile woman thirty-four years of age. In addition to the umbilical tumor, another growth was present in the pelvis. This was the size of a fist, was connected with the uterus and had spread out diffusely in the neighborhood of the right broad ligament. It could not be regarded as an exudate. The physician was interested to find out whether there was any connection between the two tumors; in other words, whether the umbilical growth was a metastasis. Wullstein examined a Müller's fluid specimen. It was everywhere covered with skin. It had a semicircular form and was about the size of a dollar. The umbilicus was raised 1 cm. above the surrounding abdominal skin, and its surface showed numerous shallow furrows. The umbilical furrow was recognized

as an irregular transverse cleft, which divided the umbilicus into two unequal portions, it becoming deeper and deeper in the middle until there was a depression 11 mm. in depth. About the middle of the under surface of the tumor was a cord about 1 cm. long, hardly as thick as a straw. This was solid and composed of connective tissue. The tumor itself was about 3 cm. long, and averaged 1.5 cm. in thickness. On section it was seen that the umbilicus was everywhere covered with skin which in all portions was thickened and markedly pigmented. From the bottom of the umbilical depression and running parallel were thick bundles of dense connective tissue. The tumor consisted of numerous dense, hard, glistening connective-tissue bundles which enclosed more or less long or round areas of loose tissue grayish in appearance, and in the interior in places were small lumina. Subcutaneous fat was absent. In the vicinity of the umbilical scar the tissue was sieve-like. The spaces of the meshwork was filled with dark brown masses about the size of poppy seeds. The meshwork consisted of firm connective tissue.

Microscopic examination of a section from the middle of the tumor showed that the epidermis was thickened. The deepest cells of the stratum mucosum were granular, and contained everywhere brown pigment. Only at the base of the umbilicus, where the papillæ were not markedly formed, was the pigment absent. Everywhere in the corium and in the subcutis were numerous mast cells. Hair and sebaceous glands were nowhere to be found. The deeper layers of the skin contained normally formed sweat glands. The tumor consisted chiefly of connective-tissue stroma and of cavities varying in size and form. The stroma, which in amount predominated over the alveolar tissue, was composed of broad, thick, dense connective tissue which contained a few cell elements but with spindle-shaped nuclei. Only around the spaces did the connective tissue form a most delicate connective tissue whose fibers formed a network

partly as fine bundles. The numerous nuclei were oval and frequently almost round. Immediately around the alveoli the connective-tissue threads formed a thick layer, really a membrana propria. The cavities were lined with cylindrical cells which were placed at right angles. Their height was not always in proportion to the size of the cavity, but seemed to depend on the pressure of the gland contents. In a few places the tubules were filled with epithelium. The gland tubules were usually cut either obliquely or longitudinally. The gland lumina near the periphery of the tumor in their width resembled the normal sweat glands. On the other hand, those in the middle of the tumor were markedly dilated and round; in the latter the tissue was frequently infiltrated with cells. The majority of the glands were filled with a secretion composed of a most delicate, rather granular network of threads mixed with epithelial cells. The entire tumor was permeated by a thick network of capillaries which surrounded the individual gland tubules. In many places in the connective-tissue stroma in the neighborhood of the bloodvessels were remnants of old and fresh blood.

In the preparations taken from the lateral portion of the tumor accumulations of round cells and bloodvessels were seen. The cystic dilatation of the canals had evidently been produced by pressure from within. The cavities were lined with endothelium and the walls of these new cavities had projections into them. These cavities were due to the confluence of the neighboring small cavities. The origin of these in some places could be followed. At several points between the blood spaces were dilated tubules lined with cylindrical epithelium, and usually filled with secretion, and surrounded by the characteristic connective tissue which sometimes reached as far as the endothelium of the blood spaces. A few of the gland-like cavities also contained blood. At no point, however, was this adherent.

After these findings we must ask: Are we dealing with an

individual tumor or is there a combination of two tumors? Further, under what category does this tumor formation belong? Wullstein held it to be a combination of cyst-adenoma of the sweat glands with cavernous angioma.

On page 250 he says what makes him believe that there is a combination of two tumors, is the fact that there is a different lining to the large spaces, the one being lined with endothelium, and the other with cylindrical epithelium. No less typical is the relation of the surrounding connective tissue to the spaces. The differences even with the low power are easily recognized, through the various micro-chemical reactions in color with methylene blue. The above already described delicate bluish connective tissue is apart from the sweat glands, and their tributaries in the specimen only present in the vicinity of the tubules lined with cylindrical epithelium, while the spaces lined with endothelium are always surrounded by a thick fibrillated tissue which stains intensely red. He thinks that the large cavernous spaces, in the first place are due to circulatory disturbances.

On page 251 he says we must look upon the sweat glands as the point of origin for the epithelium of the newgrowth, on account of the position of the tumor beneath the skin, and on account of the cylindrical epithelium and the absence of squamous epithelial nests. Its origin from the epidermis, or from the hair follicles, or the sebaceous gland, is excluded. On the other hand, we must ask if it is not due to some embryological deposit. Three things come into consideration; the umbilical canal, the urachus, and the omphalo-mesenteric duct. Have we in this mixed tumor a purely accidental combination of adenomatous cyst of the sweat glands and a cavernous angioma, or do the two varieties bear a causal relation one to the other? In conclusion he says the old and fresh hemorrhage, in various portions of the tumor, have followed as a result of hyperemia, perhaps the menstrual hyperemia.

[Wullstein's tumor also occurred in a woman. He speaks

of its characteristic connective tissue separating the gland lined with cylindrical epithelium from the surrounding stroma. Further, in his last paragraph he speaks of the hemorrhage through the tumor being due to hyperemia, possibly menstrual in origin. We think that here he has the clue, and in all probability the glands in this case were also uterine glands. While the description of the histological appearance in this case is in places rather involved, we have in our translation held closely to the text in order that the points favoring the uterine origin of the glands might not be unduly accentuated.

I wrote Professor Orth, of Berlin, and he in turn referred me to Dr. Wullstein, who at the time this case was published (1893) was an assistant of Professor Orth, and occupied the room next to mine in the Göttingen Laboratory. Dr. Wullstein kindly sent me the reprint of his article, but I was unable to get the specimen, and consequently cannot speak with absolute certainty.—T. S. C.]

N. Giannettasio, "Sur les Tumeurs de l'Ombilic" (Concerning Tumors of the Umbilicus), *Arch. Gén. de Méd.*, 1900, n. sér., t. ii, p. 52.

He gives a *résumé* of the literature on tumors of the umbilicus, and reports a case in a multipara, aged forty-four. A year and a half before she came under his observation the patient had noticed a small tumor the size of a nut at the umbilicus. This was solid, immobile beneath the skin, and occasioned no discomfort. It occupied the lower and left side of the umbilical depression. It was removed and the patient was perfectly well twenty-five months later. He gives a very good plate, but the text is not satisfactory. The nodule, however, he says contained cytogenous connective tissue. The plate shows normal skin, dilated blood-vessels, and gland spaces lined with apparently cuboidal epithelium and surrounded by a stroma, the picture somewhat suggesting uterine glands.

W. von Noorden, "Ein Schweissdrüsenadenom mit Sitz im Nabel und ein Beitrag zu den Nabelgeschwülsten" (An Adenoma of the Sweat Glands Situated in the Umbilicus, and a Contribution on Umbilical Tumors), *Deutsch. Zeitschr. f. Chir.*, 1901, Band lix, S. 215.

In the beginning of his article he states that he is going to demonstrate a tumor which, from its characteristics and anatomical picture, leaves no doubt that it originated from the sweat glands, and that as far as he knows no similar case is on record. On October 1, 1898, a thirty-eight year old multipara mentioned that for two months she had had a slight unevenness in the middle of the umbilicus. Eight days previously a physician had observed a pea-sized enlargement in the floor of the umbilicus. Clinically it suggested a nevus, and on account of the dark pigmentation von Noorden thought of melanosarcoma. On October 14, 1898, the tumor was larger than a pea, was semicircular, and was not sharply defined from the surrounding umbilical tissue. In its centre it had a small wart-like elevation. There were no inflammatory changes in the vicinity. The skin over the tumor was somewhat uneven, grayish in color, and here and there more deeply pigmented than the floor of the umbilicus. No pulsation was noted, no variation on pressure. The umbilicus was removed. Two and a half years later the patient was perfectly well.

The umbilicus on section showed a drawing in of the skin, and in the depth there was a wart-like projection. The tissue of the umbilicus itself was very hard. On section a pea-sized light brownish pigmented area was observed, which was not sharply defined from the surrounding tissue.

Microscopic Examination. The nodule was made up of a loose connective tissue with numerous large cells. It contained a large number of capillaries. Within this connective tissue were slit-shaped cavities lined with cylindrical epithelium, which has been loosened irregularly from the wall. Some of these cavities had become dilated into

irregular cystic spaces which here and there showed clearly a lining of cylindrical epithelium, while in other places they had completely lost it. The contents of these cavities had dropped out in some places, in others it consisted of cylindrical epithelium, and in numerous cases of an irregular structureless network. Further sections were made, and the squamous epithelial layer over the entire nodule was found to be intact. Over the most prominent part it was three times as thick as at the periphery. Where the cells were most abundant the deepest layers showed pigmentation. At one point, Fig. 11, the sweat glands could be traced almost to the surface, being covered only by a few layers of cells. The stroma consisted of three definite kinds of tissue; normal tissue, dense fibrous tissue, and mucoid-like tissue. The chief interest lay in the sweat glands; roots of hair were nowhere to be found, and sebaceous glands were reduced to a minimum. The search for muscle fibers in the reticulated tissue was fruitless. No elastic fibers were found. In general it may be said that the sweat glands were normal in the subcutaneous layer, and were arranged in groups. Then in one section, one would find two large openings and three or four glands, and in another section groups of from two to four glands. Some were cut in such a manner that nine to fifteen round lumina were in a line or in the form of a hook. The groups lay, as a rule, very close to one another. The normal sweat glands lay partly in the fibrous connective tissue, others—and this is to be noted—were separated by a rather broad layer of cells from the normal corium. The nuclei of this zone were pale and less abundant than in the remaining corium. This zone suggested the above-mentioned mucoid tissue in which in part the altered glands lay. This tissue appeared always to penetrate between the normal gland grouping, and had separated the glands from one another. The gland epithelium was not changed. In addition to this slightly normal and slightly changed skein-like gland there

were in the corium a number of cavities and tubules. These extended from near the surface of the papillary masses to the vicinity of the subcutaneous fat. The cavities and the tubules are to be seen in Figs. 11 and 12. [We do not clearly understand what von Noorden means by corium. It seems, however, that he uses it instead of stroma. His general description is somewhat hazy throughout.—T. S. C.]

On page 222 he gives a *résumé* of his description: The tumor is made up of many roundish and often dilated cyst-like portions, which lie deeply seated in the corium. In intimate relation to these, or independent of them, are tubular channels with numerous cork-screw-like windings. These reach toward the epidermis. The cystic and also the tubular pictures are surrounded by dense and loose connective tissue, which separate them from the surrounding connective tissue, and are without any definite capsule. In the above described coil we, without doubt, recognize the sweat glands.

On page 229 he reports one of Mintz's cases, and says that possibly the newgrowth had developed from the glandular portion of the skin, for example, from the sweat glands. He says: "I will also not assume this, but will say that portions of my tumor in respect to form, grouping, contents, and relation to the cells, both in the description and in the picture, produce a very similar appearance to the case reported by Mintz, and had it not been possible to establish a relation to the sweat glands, I should in all probability have followed the views of Mintz. Mintz found smooth muscle fibers in the connective tissue at several points. The explanation as to the origin is difficult." In conclusion von Noorden says: "From the above findings a true benign adenoma springing from the sweat glands can be diagnosticated."

[As will be noted from the history the patient was a woman, aged thirty-eight years. There was no evidence of

inflammation. Histological examination in some places showed groups of glands surrounded by a stroma differing from the ordinary surrounding stroma. These groups of glands were lined with one layer of cylindrical epithelium, and the cavities of some of the dilated spaces contained cells that had taken up blood pigment. Von Noorden draws attention to the fact that his case bore a marked resemblance in many ways to Mintz's case. There remains little doubt in our mind that the glands resemble those found in the body of the uterus, and the thickened dense stroma around them bears a marked resemblance, even with the very low power, to the stroma of the uterine mucosa. The picture, at any rate, is much more suggestive of glandular growth of the uterine origin than of one coming from the sweat glands. I endeavored, through Professor Döderlein, of Munich, to locate Dr. von Noorden, and if possible secure a section of this growth, but have not been able to do so.—T. S. C.]

It is rather difficult to classify this tumor, but as it presents a few clinical and histological points suggestive of the group under consideration, I mention it here, although it is not considered in the digest.

Villar, "Tumeurs de l'Ombilic," *Thèse de Paris*, 1886. Observation 68. L. L., aged forty-six years, entered the service of Professor Guyon September 17, 1886. In the month of December, 1885, nothing abnormal was noticed in the umbilical region, but shortly afterward her corsets produced pain in this region, and she discovered a small tumor the size of a pinhead, reddish in color, in the umbilical depression. This tumor increased very slowly, and in May, 1886, she went to the hospital for examination. She continued under treatment, and in the month of August entered the hospital. At that time at the umbilical depression was a tumor the size of a bird's egg. It was conical. Its base was continuous with the cicatrix, and was somewhat

constricted by the depression. It had a very narrow but relatively large pedicle. It was in reality sessile, firm in consistency, but elastic and reddish in color. At the top was a blackish point 2 mm. in diameter. The tumor itself was not ulcerated and did not discharge any liquid. Two or three days after she entered the hospital the blackish point ruptured, and there was an escape of tarry blood. The patient experienced no pain, and there was no nodular enlargement.

Histological Examination by Clado. The tumor is situated in the centre of the umbilicus and has developed in the depth of the cicatrix. It is covered with skin. In consistence it is a little less firm than a fibroma. On section one finds a capsule which surrounds the central mass. The tumor is whitish gray, with numerous dark spots, not any larger than the head of a pin, scattered throughout it. Microscopic examination shows that the tumor is formed of sarcomatous tissue, the cells being fusiform in shape. Some of the spaces are round, others oval and have anastomosed with one another. Some of the canals are lined with pavement epithelium. Between the cystic spaces one finds stroma containing a small number of vessels. The skin which composes the outer covering of the tumor is exceedingly thin, but presents the characteristic appearance. There has been extravasation of blood at the centre of the tumor.

[This woman, as above noted, was forty-six years of age. The history does not convince one absolutely that this is a sarcoma. It might very well be a fibroma. It resembles, in a few particulars, those tumors of the umbilicus that contain uterine glands, or glands faintly resembling them. —T. S. C.]

BIBLIOGRAPHY

Literature consulted in the preparation of umbilical tumors containing uterine mucosa or remnants of Müller's duct.

Ehrlich. Primäres doppelseitiges Mammacarcinom und wahres Nabeladenom (Mintz), Aus von Eiselsberg's Klinik. Archiv f. klin. Chir., 1909, Band lxxxix, S. 742.

Giannettasio. Sur les tumeurs de l'ombilic. Arch. Gén. de Méd., 1900, n. série, t. 3, p. 52.

Green. Transactions of the Pathological Society, London, 1899, vol. l, p. 243.

Herzenberg. Ein Beitrag zum wahren Adenom des Nabels. Deutsche med. Wochenschr., 1909, Band i, S. 889.

W. Mintz. Das wahre Adenom des Nabels. Deutsch. Zeitschr. f. Chir., 1899, Band li, S. 545.

W. von Noorden. Ein Schweissdrüsenadenom mit Sitz im Nabel und ein Beitrag zu den Nabelgeschwülsten. Deutsch. Zeitschr. f. Chir., 1901, Band lix, S. 215.

L. Wullstein. Eine Geschwülst des Nabels (Kombination von Cystadenom der Schweissdrüsen mit cavernösem Angiom). Arbeiten aus dem Path. Inst. in Göttingen. R. Virchow, 50 Doctor Jubiläum, 1893, S. 245.

DISCUSSION

DR. JAMES E. THOMPSON, of Galveston, Texas.—I have been very much interested in Dr. Cullen's paper, and I would like to know whether Dr. Cullen has advanced any information from an embryological point of view as to these umbilical tumors containing uterine mucosa.

DR. CULLEN (closing).—In 1895 I read before the Johns Hopkins Medical Society a paper on Adenomyoma Uteri Diffusum Benignum.[1] In 1896 v. Recklinghausen published a most complete and comprehensive monograph[2] on adenomyoma of the uterus, and from a careful study of the large amount of material at his disposal came to the conclusion that the gland elements in adenomyomas of the uterus owed their origin to remains of the Wolffian duct.

In the wealth of material coming to the Gynecological Laboratory at the Johns Hopkins Hospital I had ample opportunity to

[1] Adenomyoma uteri diffusum benignum. Johns Hopkins Hospital Reports, vol. vi.

[2] V. Recklinghausen, F. Die Adenomyome und Cystadenome der Uterus und Tubenwandung, ihre Abkunft von Resten des Wolff'schen Körpers, Berlin, 1896.

study all stages in the development of adenomyomata of the uterus while v. Recklinghausen in his autopsy material saw only the end stages of this process. The results of my findings extending over a period of fifteen years have already been published.[1]

In adenomyoma of the uterus there is usually a diffuse thickening of the inner muscular layers of the organ. The thickening may be limited to the anterior or posterior walls, but often encircles the entire cavity. This coarse diffuse myomatous tissue contains chinks and into these the uterine mucosa flows. If the chinks be small, isolated glands may be seen penetrating into the depth, but where they are broad, large areas of mucosa are found extending into the depth. These downgrowths of mucosa consist of normal glands surrounded by the characteristic stroma of the mucosa. As the diffuse adenomyomatous growth advances portions may become subperitoneal or submucous. In the majority of the cases at least the glands in an adenomyoma of the uterus owe their origin to the uterine mucosa or to remnants of Müller's duct. In 1896 it was my good fortune to discover the first case of adenomyoma of the round ligament.[2] Shortly afterward my colleague, Dr. William Wood Russell,[3] reported large quantities of uterine mucosa in the hilum of the ovary.

In the early embryo Müller's duct is not far removed from the umbilicus and if one has found uterine mucosa at the hilum of the ovary and in the round ligament in the inguinal region I feel sure someone will in the near future be able to explain to our satisfaction how uterine glands reach the umbilicus.

[1] Thomas S. Cullen. Adeno-Myome des Uterus, Verlag von August Hirschwald, Berlin, 1903. Adenomyoma of the Uterus, W. B. Saunders Co., Philadelphia, 1908.

[2] Thomas S. Cullen. Adenomyoma of the Round Ligament. Johns Hopkins Hospital Bulletin, May and June, 1896, Nos. 62 and 63.

[3] William Wood Russell. Aberrant Portions of the Müllerian Duct Found in an Ovary. Johns Hopkins Hospital Bulletin, January, February, March, 1899, Nos. 94, 95, 96.

THE ESSENTIAL FACTORS IN THE CURE OF INGUINAL HERNIA IN THE MALE

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By a singular combination of fortuitous circumstances in 1870 I felt sure that I had solved "the thousand-year-old problem of the profession"—the permanent cure of inguinal hernia in the male. I need now to refer only to the long years since this period, during which the operative procedures then enunciated have been carried into successful effect by hundreds of surgeons in all parts of the world.

In every age a very considerable percentage of all males have been doomed to suffering, because of a greater or less opening in the inguinal canal. It is fair to assume that no other surgical problem has received more thoughtful attention from the earliest period of surgical writing until the present, and yet even today the truss wearing army is numbered by its many thousands in every land.

The cause of inguinal hernia in the male is evident. By a singular change of seeming purpose, in the later months of intra-uterine life, the testicles, which had their origin within the abdominal cavity, are withdrawn through the abdominal wall and placed within the scrotal pocket. The study of these changes is both interesting and profitable, but can only be referred to here. In normal development there results a canal which traverses the abdominal wall so obliquely that the intra-abdominal pressure is exerted at

right angles to it, and consequently the greater the pressure the more firmly is the canal closed.

Unfortunately, physiological processes attendant upon the transit of the testes through the abdominal wall, occurring at this late period of development, are often very incomplete, and there results as a consequence an imperfect closure of the canal, most often existent upon the upper and inner portion of the structures called the internal inguinal ring. When these physiological processes are not complete, as would naturally be expected, the defective result consists in the imperfect development of the structures which go to make up the upper portion of the inguinal ring and canal.

So common is this, that, in persons who have never had an escape of the abdominal contents into, or through the inguinal canal, and as a consequence have been considered of normal development, a postmortem examination often shows clearly a more or less defect of these structures.

Cloquèt, of Paris, at an earlier period recorded the results of five hundred autopsies, made for the purpose of determining the structural relations of hernia, and described this weakening of the internal ring as normal anatomy, and since his day it has been called after him, as he then described it, the *infundibular process* of the peritoneum. This, however, is not normal, and in the well-developed adult will be found only by making tension upon the cord when the peroneal attachment to it will become more or less slightly depressed.

It is my firm conviction that hernia rarely if ever takes place, even in advanced life, unless there has been an imperfect closure of these structures in the infantile period. This, so to speak, valvular principle is availed of by nature in only two other instances: the opening of the biliary and pancreatic ducts into the intestine, and the insertion of the ureter into the urinary bladder. It was the early study of this latter process that caused me to determine that the imperfect implantation of the inguinal canal

through the abdominal wall was the cause of hernia, and that its cure must necessarily be dependant upon its reconstruction, so that the intra-abdominal pressure would be exerted at an angle to compress the sides of the canal, instead of upon a line in the direction of its axis.

The circumstances making it possible for the safe reconstruction of the inguinal canal are, first, the making and maintaining of an aseptic wound, thereby giving as a result primary union. This, as Mr. Lister's first American pupil, I had demonstrated as a safe procedure. The second important factor is the removal of the redundant portion of the peritoneum after the reduction of the hernia contents and the closure of the posterior structures, which is necessary to restore the canal to its normal obliquity. This can only be done by the use of buried sutures, and the suture material itself, we are insistent, must be of sterile absorbable material. Then the cord is replaced and closed over with its normal structures. The skin is coapted by a minute absorbable buried suture and the wound sealed with iodoform collodion reinforced by a few fibers of cotton.

Based upon a long series of experimental studies upon the lower animals, I demonstrated that the buried aseptic animal suture material is primarily surrounded by leukocytes, is invaded by them, and that they in turn *pari passu* are themselves transformed into connective-tissue corpuscles, replacing in a measure the buried suture and reinforcing the parts by living bands of connective tissue.

Even at this early period we became convinced that drainage, then universally used, could be only harmful, and in aseptic wounds should never be applied.

An operation thus completed required little further attention or dressing, and in its inception and technique was so absolutely radical and revolutionary that, viewed through the vista of the years, I cannot now wonder that even with my enthusiasm I made so few converts.

Although these principles and methods were published

and republished at this early period, they failed of general approval by the American profession until after the publications of Basini, who, some time previous to his operations, had been in attendance upon the International Congress in London, in 1881, where I read an elaborate paper upon the subject.

Of course many modifications of these procedures have been devised by surgical students and advocated as possible improvements.

Here opens a wide field for interesting discussion, which the limits of this paper forbid. Suffice it to say that the fundamental principles here enunciated must ever exist, and without the intelligent knowledge of these factors the cure of hernia is necessarily empirical and accidental.

I have deemed it the more important thus briefly to review what I consider the fundamental principles, which must be thoroughly understood and kept in mind by every successful operator, since only this present month, in the *Military Surgeon*, Lt. Col. Ruotte, of Paris, in a paper entitled "The Operation for Inguinal and for Femoral Hernias," ignores entirely the importance or need of the reconstruction of the inguinal canal to its normal obliquity. I quote the following:

"Concerning inguinal hernia the operation is based upon the pathology and anatomy of the inguinal region. Pathology teaches us that the entire extirpation of the sac is the most important procedure for success, and that the anterior wall of the inguinal canal only is to be considered for the firmness of the ultimate result.

"The posterior wall being of no importance to the surgeon, it is always possible to cut out the sac, without regard, not only as unnecessary, but as bad, the section of the anterior wall, which many surgeons are yet employing.

"The operative technique is as follows: An incision, exclusively cutaneous, is made to an extent of three centimeters at the most, exactly corresponding to the external

opening of the inguinal canal without reaching the origin of the scrotum. When the skin has been cut the subcutaneous tissue appears with the veins; the fingers of each hand back to back, tear the adjacent tissue down to the inguinal opening, discover the cord, which is isolated and brought out on the finger. Among the constituent elements of the cord it is easy to recognize the sac, which is to be separated from the other elements, tied as high as possible at its origin and divided. One or two catgut sutures are put in so as to narrow the inguinal opening, and the skin is joined with two silkworm sutures or with clasps.

"The method which I have described is that generally followed in the French army, and in our hands has proved eminently successful."

Lt. Col. W. B. Banister, U. S. A., in the discussion of Col. Ruotte's paper, stated "that the French method advocated by the reader is much simpler and a much more rapid procedure than our practice, but it does not oppose the bulwark to prevent return of the hernia, which we regard as essential. Our work on favorable subjects is very successful.

"It is possible that the reader thinks we are still doing the old Halstead operation. This was abandoned years ago and, as a matter of fact, was never much used."

It will be seen from the above that, at the most, the reinforcement of the structures going to make up the inguinal canal is dependent upon the reparative processes which supervene, incident upon the suturing of the resected, more or less redundant, peritoneal pouch or sac.

The writer states that the posterior wall of the canal is of no importance, and that the ultimate result upon which permanent cure depends is the firmness of the anterior wall of the inguinal canal. This, however, he insists is to be let alone, since section of the anterior wall is not only unnecessary but injurious. (In the brief description of the operation given, emphasis is made upon a short cuta-

neous incision over the external opening of the inguinal canal not to exceed an inch in length. The subcutaneous structures are torn by the fingers until the cord is isolated and exposed. The sac is separated and tied as high as possible at its origin and divided.) This procedure, which he designates as the French operation, is not at all in accord with the teaching and practice of some of the best French surgeons. The original observations and studies of hernia by Lucas Championnière, of Paris, are especially noteworthy. I think it just to Col. Ruotte to believe he limits his operation to incipient cases, although it is not so stated. In this connection it is of importance to determine just what constitutes the posterior wall of the inguinal canal. As Sir Astley Cooper pointed out, in exceptional cases the muscular fibers of the transversus may be easily traced above the internal ring, in which case the entire transversus makes up a large part of the posterior wall of the canal. More commonly, however, there is a firm fascia uniting the posterior border of the transversus with the internal oblique muscle, and it is a lack of firm union of these structures that causes a depression of the internal ring.

Since the internal ring is through the transversalis fascia—the firm abdominal fascia that lies just outside the peritoneum—the posterior wall of the inguinal canal consists of this fascia throughout its length. At the inner third (or half) the fibers of the internal oblique muscle—which at the outer portion of the canal lay anterior to the cord—wind around from above, behind the cord, but in front of the transversalis muscle to form the conjoined tendon, reinforce the posterior wall of the canal at its inner portion just behind the external ring and greatly strengthen the abdominal wall at this point. The deep epigastric artery passes upward between the internal and external rings and usually but a little to the inside of the deeper or internal ring.

The anterior wall has the aponeurosis of the external oblique muscle throughout, as the external ring passes

through this aponeurosis; and in addition, in front of the cord at its outer part and anterior to the internal ring, the internal oblique muscle also strengthens this part of the canal throughout a third of its length.

Of course, the peritoneum in itself, while it necessarily lies behind the canal and cord, from its very nature can in no way act as a buttress of support. The best evidence of its yielding elastic character is found in old scrotal hernias where the peritoneum is enormously distended, covering the abdominal tumor.

In a hernia which is at all pronounced in character, the sac should be removed, and from the very first I have taught that it was better to put it a little upon tension and suture it evenly across from below upward to the cord; but there can be no question that the primal importance is the closure of the structures which normally go to make up the posterior wall of the canal.

Of course this necessitates a free dissection of the parts with the elevation of the cord, which is replaced after the suturing of the posterior structures.

Then the anterior wall is reformed. The method of suturing is of less importance and perhaps is best done in the way with which the operator is most familiar. I consider, for many reasons, a double continuous tendon suture preferable. The skin is coapted by a light continuous suture and the collodion seal ends the operative procedures.

In my earlier publications, I gathered an immense amount of data, showing the safety and certainty of cure.

Dr. Coley, of New York, has tabulated his experiences with those of the late Dr. Bull, much of the work having been done in the Children's Hospital, and these alone are sufficient to prove the advisability and wisdom of operation, which can be formulated as a rule having few exceptions. My own experience, which covers several hundred operations for inguinal hernia of almost every conceivable character, demonstrates the advisability of operation.

Except where the integrity of the intestine has been involved, there has not been a single fatal result, and so far as I have been able to trace the remote results of operative procedure, I think 4 per cent. of return of the disability is an ample margin.

With comparatively few exceptions, the great truss wearing army is entitled to emancipation from conditions which every day are productive of suffering, and incident to which danger to life may any day be involved.

Any contribution which I have been able to make in my service to the public is a votive offering most gladly tendered in honor of our noble profession. Dependent, as for a long time we seemed of necessity to be upon European teaching, we still have the habit of accrediting unduly to foreign authorship much to which our own students are justly entitled.

My late revered teacher, Prof. Virchow, as President of the International Medical Congress, held in Berlin in 1890, stated that it was only just to concede to America the surgical leadership of the present. In the contribution of Lt. Col. Ruotte referred to as based upon one thousand operations, it is called the "French method." Based upon a generation of experience covering many thousands of operations by hundreds of surgeons the inguinal canal has been restored to its normal obliquity, followed by easy and permanent cure. Let me suggest that this operation be called the "American method."

DISCUSSION

Dr. George Tully Vaughan, of Washington, D. C.—I would like to say a word with reference to the history of this operation that Dr. Marcy has been talking about. First, I wish to say that I got the essential principles of the operation from Dr. Marcy.

In 1894, while I was in Germany I heard about the Bassini operation, and I thought I would visit Bassini and see what he had to show. I went from Vienna. Dr. Bassini was kind to me and showed me several of his operations. After seeing his operation, I found it was exactly like the one Dr. Marcy does with slight modification. Bassini did not speak English, and as I did not speak Italian we could not discuss the subject as intelligently as we otherwise might have, and that may account for some misunderstanding about the operation. I do not know who had the first idea, but Dr. Marcy first published this method of operating I think, and in a little book on surgery which I had the temerity to write, I gave Dr. Marcy credit for this operation. I think he deserves it.

Dr. Guy Leroy Hunner, of Baltimore.—I had occasion some three or four years ago, in looking up the literature of the subject, to go back as far as I could. I had been brought up by Dr. Halsted and his school of hernia teaching, and naturally got to thinking that everything that was worth while had originated at the Johns Hopkins Hospital. I was surprised to find in looking back over the literature that Dr. Marcy in his original article in 1878 covered every essential feature of the present hernia operation. Of course, there have been a great many modifications since then of greater or less improvement, probably of less improvement from the fact that most of these modifications have been dropped. But Dr. Marcy really covered the essential features of this inguinal hernia operation, and we should feel proud as an association to have this venerable youth with us and should give him credit for this operation which he so modestly wishes to call the American operation. It ought to be called the Marcy operation.

Dr. Albert Vander Veer, of Albany, N. Y.—I wish to endorse what has been said. My first operations for the radical cure of hernia were carried out along the lines indicated by Dr. Marcy. I agree with Dr. Hunner that the operation should be called the Marcy operation rather than the American operation.

Dr. W. P. Carr, of Washington, D. C.—I want to endorse what the last two speakers have said, and to refer to one thing that was brought out by Dr. Marcy, and that is, the infundibular process in the peritoneum is not a normal condition. I taught anatomy a good many years ago and tried to demonstrate it to students, but was usually obliged to tell them that it could not be shown in injected cadavers.

Dr. J. W. Long, of Greensboro, N. C.—It is hardly apropos to say what I am about to say, but it is a long way to Boston, and as Dr. Marcy is with us to-day, I believe it would be in accord with the spirit of the meeting if I should state what is a fact, namely, that Dr. Marcy performed the first recorded operation for the removal of gallstones from the common duct.

Dr. Marcy (closing).—I wish to thank the members for their very complimentary remarks of what little I have done regarding the operation I have described.

It is only just to say that Lieutenant Colonel Ruotte, of Paris, referred to the incipient stages of hernia. I cannot understand why he takes the ground he does that a simple closure of the peritoneum can have very much to do with the strengthening of the parts. The peritoneum is very elastic to cover a large hernia which may comprise one-quarter of the abdominal contents. Then, the peritoneum has been stretched over in such a way that it becomes thin, and it cannot be considered a restrictive material portion of the tissues for retaining the contents of the abdomen.

INTERSTITIAL ECTOPIC PREGNANCY

By Charles R. Robins, M.D.
Richmond, Virginia

In 1324 cases of ectopic pregnancy collected from the literature by Rosenthal there were less than 3 per cent. of the interstitial variety. The specimen which I present furnishes a very beautiful example and is the only case which has occurred in my own practice.

The patient gives the following history:

Private records: 16–569. Aged twenty-seven years, colored, female, III-para, one miscarriage.

Her last menstruation occurred in June, since which time there has been no bloody discharge. In the early part of July she was taken with sharp pains in the lower abdomen, worse in the right iliac region. After this for a while she would have a severe attack of abdominal pain every night, felt on both sides and radiating to the shoulder on the right side. She later would have recurring attacks, and a few days after an attack could feel a mass in right side. She was confined to bed for five weeks, and then got up for four or five days, when she had another severe attack, and was forced to return to bed. Her pains were severe all over the body; she was covered in a cold sweat, and had a chill. At this time the pain settled in her right side and has remained there constantly ever since. She has suffered from marked constipation for four months. Urination is frequent and burning.

At the time of the examination she had a temperature of

101°. The patient was quite fat, but a tumor could be made out in the lower abdomen half-way to unbilicus. The recti muscles were somewhat rigid and there was marked tenderness over the right iliac area. On bimanual examination the uterus was made out, although not sharply defined, the enlargement being greater on the right side. The size of the uterus corresponded to about a three-months' pregnancy. There was no bloody discharge, and the patient said that she had had none since June.

A diagnosis of ectopic pregnancy had been made by my associate, Dr. I. T. Gorsline, but the possibility of an appendicitis complicating pregnancy was considered. There was a leukocytosis of 17,000, but no differential was made.

On September 7, an exploratory McBurney incision was made, and the abdomen found full of fluid blood. A median incision was then made, the clots cleaned out of the pelvis, and the uterus delivered. The right side was found enlarged with several points of rupture, and with the membranes showing through. The uterus was removed by a supravaginal hysterectomy.

Section of the specimen shows an unruptured sac with hemorrhages between the membranes and the walls of the gestation cavity, the chorionic villi well developed, and a perfectly formed embryo. The tube on the right side and the cavity of the uterus are both intact, the latter containing a well-developed decidua. The case is unusual in not having had uterine bleeding at any time.

DISCUSSION

Dr. Thomas S. Cullen, of Baltimore.—Dr. Robins is to be congratulated on his presentation to the Society of these three beautifully preserved specimens of cornual pregnancy. One of the most recent cases of this character that I have seen was published by Dr. James Markoe [1] of New York. We have met

[1] Bulletin of the Lying-in Hospital, New York, 1911.

with very few cases of cornual pregnancy at the Johns Hopkins Hospital.

In 1893 I started the routine examination of the uterine cornu in all cases where a hysterectomy had been done. In each case a section was taken through both cornua. It was very interesting to see how frequently gland spaces surrounded the main canal passing from the uterine cavity to the tube. At first these were difficult of explanation, but after making many sections we found that these glands were nothing more than prolongations from the uterine mucosa, the glands running sometimes parallel at other times at right angles to the general lumen.

In other instances the gland spaces were found to be prolongations of the tubal epithelium into the surrounding muscle.

It is only necessary that the ovum lodge in one of these gland-like depressions on its way from the tube to the uterine cavity to have as an end result a cornual pregnancy.

Dr. Rudolph Matas, of New Orleans.—I have had one experience along the lines suggested by Dr. Robins' paper, which I will endeavor to illustrate on the blackboard by a diagrammatic representation of the anatomical conditions as I found them:

A young woman, aged twenty-five years, came to me with a tumor or swelling in the abdomen that had been diagnosticated as appendicitis. I found a twisted strangulated and suppurating dermoid cyst of the right ovary. The cyst was adherent to the bowels and other pelvic organs. The cyst, which included the right ovary and tube, was ligated at its pedicle, close to the right horn of the uterus. The patient married a year after this occurrence. About six or seven months after marriage I was called to see her again. She was suffering great abdominal distress. The uterus was much enlarged, and her symptoms suggested pregnancy; but the uterus was not uniformly enlarged. There was a distinct large fibroid tumor-like mass which had developed in the right horn. I could scarcely believe a fibroid had grown so rapidly, but I could not account for the large one-sided tumor which undoubtedly existed. I did another laparotomy, and was surprised to find that the tumor which has all the external appearances of a soft, rapidly growing myoma, was in reality an interstitial or mural pregnancy, apparently originating in the right horn. I enucleated the tumor mass as I would a myoma by myomectomy, thus cutting off more than

the right half of the fundus of the uterus. The uterus was thus left with only the left cornu and the corresponding tube and ovary. Fearing that pregnancy would be fraught with danger if it took place in this mutilated uterus, I folded up the tube and ligated it several times, with linen thread over the cornu, expecting to occlude the cornu and tube permanently by this procedure. But now comes the curious end of the story. The year following this second operation, and in spite of the seemingly serious obstacle put to conception, the patient became pregnant again and was delivered of a fine baby at term. Here we have two interesting sets of facts. In the first place an interstitial, cornual pregnancy took place in the right horn of the uterus after the right tube and ovary had been removed one year before. In the second place, full-term pregnancy occurred in the mutilated uterus, after the repeated ligature of the only cornu and tube left after the previous operation. The uterus had evidently adapted itself to its crippled condition; and the extensive scar following the previous cornual resection was able to resist the test of parturition without rupture. The early conception following the ligature of the only remaining cornu proves, once more, that the mere ligature of the tubes and cornua is no bar to conception or a prophylactic against pregnancy. Apparently there is no way of preventing conception without mutilation, except by burying the ovaries under the peritoneum in pockets formed in the broad ligaments, in a way that the ova never reach the free peritoneal surface.

Dr. Cullen's researches on the accessory tubal ducts throw much light upon the pathogenesis of interstitial and extra-uterine pregnancy—but the fact that a cornual pregnancy took place on the side from which the ovary and tube had been previously removed is indeed curious, to say the least.

Dr. Guy Leroy Hunner, of Baltimore.—I do not wish to vie with these gentlemen in telling tales, but in reference to the case cited by Dr. Matas, our president, the tubal end might have been tied off after opening it. I should think that while it might be an interstitial pregnancy, it would depend upon the length of the stump that is left. Tying off the stump does not do much harm to the patency of the tube as he proved, by tying off the other side.

I remember the case of a poor woman who had borne a number of children, and who had a bad condition of the pelvic outlet. She had an enlarged heavy uterus, on which I wished

to do a fixation, to insure a better final result. I excised each tube, making a little oval excision with the knife, and turned each tube back on itself and tied it with linen. I covered over the two cornua of the uterus with peritoneum, or brought the peritoneal edges together, so that there were no raw areas. I assured the patient she would not become pregnant again. Six months later she returned and was about three months pregnant. I had to curette her.

Dr. W. M. Jordan, of Birmingham, Ala.—I would like to have Dr. Robins or Dr. Cullen answer whether interstitial pregnancy is apt to occur in a bicornate uterus in line with the explanation Dr. Cullen has made.

I recall a case I saw in consultation last July. The woman was three months pregnant. Rupture had taken place into the abdominal cavity, and she was said to be dying from hemorrhage. It was about twelve hours after the accident before I saw her. It was beyond my understanding why she did not die before she reached the hospital. She arrived there in practically a moribund condition, and operation was hastily undertaken without anesthesia of any kind. The operation was performed by a colleague, and I helped him. He made a rapid incision; I secured the vessels at the clear space on the left side with ligature, and while I was doing that he clamped and tied the other end. A large quantity of clots and a fetus about the size of the little finger escaped from the cul-de-sac. We closed the woman up. She died in three hours. On making an examination of the specimen it was found to be the left side of a double uterus.

Dr. Geo. H. Noble, of Atlanta, Ga.—The essayist is fortunate in not having to deal with an extensive rupture and copious hemorrhage in the case reported, for the tendency of cornual and intramural pregnancies to fatal hemorrhage is very great. Even in tubal pregnancies the nearer the uterus the rupture occurs the greater is the hemorrhage. Cornual and intramural pregnancies should be placed in the same class clinically, and I will detail a case here with some interesting features.

It was a case of pregnancy at full term in bicornate uterus, the fetus was delivered from the right horn spontaneously. At the close of the second stage of labor I noticed a more or less elastic mass extending upward, outward, and backward on the left side that resembled a fibroid tumor except for its pyriform shape. This caused me to suspect the condition of affairs at once.

In tracing the umbilical cord, I found a small opening on the left side of the uterus just above the internal os that would bearly admit my finger. After dilatation and passing the hand through the opening, the placenta was located in the left horn of the uterus. (See Figure.) In removing it two fingers were passed upward and out through the horn of the uterus into the Fallopian tube, in which a mass of placenta about the size of a base ball was firmly attached, and considerable difficulty was experienced in removing it on account of the instability of the parts and flaccid condition of the Fallopian tube, but it was successfully removed, and good recovery followed.

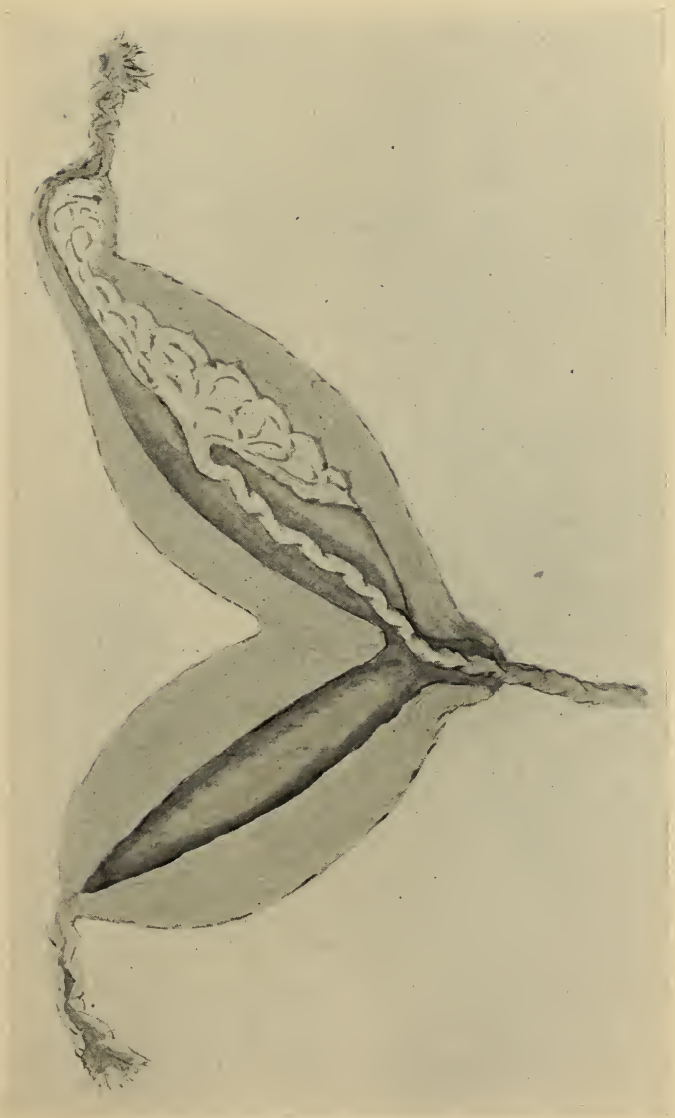
I mention this case because we not infrequently encounter cornual pregnancies, and they may become a source of embarrassment when not recognized.

Dr. Cullen.—Dr. Jordan's question reminds me of a most interesting case that came under the observation of Dr. George L. Wilkins and myself in 1894.[1] This patient was twenty-nine years of age and died suddenly of abdominal hemorrhage in the fourth month of pregnancy. At autopsy 4000 c.c. of blood and a three or four months' fetus with its membranes were found free in the abdomen. There was a right horned uterus to which a pregnant left rudimentary horn was attached by a muscular band. This pregnant horn had ruptured. The corpus luteum was on the side opposite to that of the pregnancy. On histological examination the right well-developed uterus was shown to possess a typical decidua and the right tube contained remains of the placenta lying free in its cavity. The pedicle joining the two horns contained a canal 5 mm. in diameter. This was lined by one layer of cylindrical epithelium resting on a delicate stroma, external to which was a longitudinal muscular coat and covering this again was a coat of circular muscle fibers. The canal was closed at both ends; there was no communication between the vagina and pregnant horn. In this case the ovum and spermatozoa probably migrated via the abdominal cavity.

Several years ago I dilated and curetted a patient for dysmenorrhea. Later she married and came giving symptoms most suggestive of extrauterine pregnancy.[2] To one side of the

[1] Pregnancy in a rudimentary uterine horn, rupture, death, probably migration of ovum and spermatozoa. Johns Hopkins Hospital Reports, vol. vi.

[2] Pregnancy in one horn of a bicornate uterus, giving symptoms identical with those of tubal pregnancy. Johns Hopkins Hospital Bulletin, May, 1906, vol. xvii, No. 182.



Dr. Noble's case of pregnant bicornate uterus.

uterus was a hard mass about the size of the uterus. After careful consideration it was deemed wise to make a small exploratory abdominal incision. This revealed a bicornate uterus. A two months' pregnancy existed in one uterus. The other was empty. It is perfectly natural that in some of the cases where pregnancy exists in one horn symptoms of extra-uterine pregnancy should exist, as the pregnant cornu is an extra-uterine pregnancy as far as the non-pregnant cornu is concerned. In my case the pregnancy was in no way disturbed and the patient proceeded to term.

A REVIEW OF A SERIES OF OPERATIONS FOR ALL FORMS OF APPENDICITIS

By Edward G. Jones, M.D.
Atlanta, Georgia

This paper relates to operations by me on 139 individuals. The list includes:

1. Sixty-three patients with appendicitis in the acute form, subdivided as follows:

Catarrhal	7
Diffuse without gross extra-appendicular involvement	24
Suppurative without peri-appendicular abscess	6
Perforative and suppurative with abscess	20
Gangrenous	6

2. Thirty-seven with a history of several attacks but with no acute pathology at operation.

3. Eighteen with no history of definite attacks but with discomfort or indigestion, or both.

4. Eighteen whom it has seemed permissible to include because they had at least suspicious histories of appendix trouble, but upon whom other abdominal or pelvic operations were done. (These 18 might properly be included under 2 and 3 above.)

5. Two with adhesions from previous operations done by other surgeons.

6. One with a malignant cecum.

7. Five (included above) for closure of fistulæ when the appendix had been left.

One patient died, being practically moribund when simple drainage, without other intervention, was instituted. In no instance was operation denied the patient on account of the seriousness of his condition.

In 10 of the acute cases there was evidence of quite extensive spreading peritonitis, while in an additional 3 cases peritonitis was general.

Definite fecal concretions were noted in 20 instances, though I believe they were present in a larger number of cases and no memorandum made.

The appendix was left at operation in 9 of 20 abscess cases.

Of these 9, 3 (Nos. 20, 47, 59) required subsequent operations to close the fistulæ; 1 (No. 32) with ordinary drainage has had no subsequent attack; 2 (Nos. 48, 98) with vaginal drainage have had no subsequent attacks; 1 (No. 33) has had one or two subsequent attacks, with indigestion and general bad health; 1 (No. 42) has not been heard from.

As to the condition of the appendix in Class 2 (so-called interval cases) it was:

	Patients.
Thick and partly doubled in	2
Thick and short in	2
Small, short, and anemic in	3
Adherent from base to tip in	7
Adherent in a part of its length in	6
Without apparent pathology in	9
Strictured in	2
No memorandum was made for	6
Total	37

Respecting the 9 in whom no pathology was apparent, 4 (7, 43, 92, 113) are cured; 1 (25) whose bill is unpaid is reported no better; 3 (34, 110, 125) are not in good health, but the attacks of colic are cured; 1 (89) has not been heard from.

For Class 3 (persons without definite histories) the condition of the appendix was noted as follows:

	Patients.
Strictured in	2
Definite adhesions in	6
Pathology doubtful in	7
No information about	3
Total	18

Respecting the 7 whose appendix pathology was doubtful 2 (18, 78) were only mildly benefited; 2 (58, 108) are improved of indigestion, constipation, and flatulence, but are not entirely well; 2 (62, 115) are cured; 1 (68) has not been heard from.

The first attack is reported to have occurred in these patients as follows:

	Per cent.
In first decade	4 plus
In second decade	35 plus
In third decade	40½ plus
In fourth decade	15 minus
In fifth decade	5 minus

The youngest patient was nine years old, the oldest fifty; the average was 23.8 years. (The above list excludes persons operated on for other troubles and those who had no definite attacks.)

The age at time of operation was:

	Per cent.
In first decade	2.6 plus
In second decade	17.0 plus
In third decade	54.0 minus
In fourth decade	21.0 plus
In fifth decade	5.0 plus

The average age was 26.4 years. The youngest patient was ten and the oldest fifty. (This also excludes same as previous table.)

Exclusive of patients operated on at the same time for other troubles, 64 per cent. were males and 36 per cent. females.

Information is at hand respecting any family predisposition on the part of 63 patients.

Forty-eight deny attacks in their families, including uncles and aunts; 5 report an attack for an uncle and an aunt; 4 for a sister or brother; 1 for uncle and brother; 1 for one brother and one sister; 1 for a daughter; 1 for a son; 1 for her mother; and 1 for two aunts; two uncles, two brothers, one sister, father and mother.

For 93 patients constipation was noted to precede the attacks usually in 51 instances; 10 patients were habitually constipated; 4 were sometimes constipated preceding attacks; and 28 did not notice that constipation preceded the seizures at all.

Only 7 persons out of 79 noticed that diarrhea preceded the attacks; and in 5 of these 7 patients its occurrence was variable, they having experienced several appendix attacks.

Of 85 patients, 22 noticed that a heavy or injudicious meal preceded the attack; 15 thought at first that dietetic errors were responsible for the trouble; and 6 stated that sometimes this was so and sometimes not.

Fourteen patients thought they had an undue amount of mucus in their stools when they came to operation. They were cured with 4 exceptions. Of these 4, 2 were operated upon during acute attacks, while it is possible that 2 may have been suffering from mucous colitis or some overlooked pathology and not appendicitis, for they remain neurasthenics and still complain of discomfort, although practically typical histories were given by them and one had a strictured appendix.

Eleven of the patients with definite seizures thought that some unusual physical effort like straining, lifting, jumping, etc., initiated the trouble. One gave a fairly trustworthy account of running against the corner of a table just prior to the onset of abdominal pain.

Of the acute cases 1 was operated on at the end of ten hours; 3 about the end of twenty-four hours; 2 in thirty-six hours; 6 in forty-eight hours; 8 in seventy-two hours; 7 on the fourth day; 5 on the fifth day; 2 on the sixth day; 9 on the seventh day; one on the eighth day; 2 on the ninth day; and 5 on the tenth day.

The earliest opening of an abscess was at the end of the third day. The earliest gangrene was at the end of the second day.

I have not been able to connect with the attacks any

suggestive definiteness tonsillitis, or rheumatism, or typhoid fever. Quite a number of the patients had had one or more of these diseases, but the number is not suspiciously large, and apparently these troubles had no bearing upon the incidence of appendicitis. One patient (77) had acute tonsillitis at the time the abdominal pain came on.

Pain was the first disturbing symptom in all the patients (about whom a note was made) who suffered definite attacks with the following exceptions: 3 say nausea appeared first; 1 says nausea and a chill; and 1 says a chill.

Forty-six of 93 patients say the pain came on suddenly, and 47 say it appeared gradually—though it is evident that different persons will attach a different significance to the word "sudden" or the word "gradual."

Twenty-eight of 75 patients say the first pain was general over the abdomen; 23 say it was about the navel; 10 in the upper abdomen; 8 in the lower abdomen; and 6 in the lower right abdomen.

More patients describe the pain as settling in the right lower abdomen about the twelfth hour than at any other time; the next most favorite hour is about the twenty-fourth; and the next about the sixtieth. It is apparent that the patient's opinion on this point is unreliable, since the pain is frequently by this time obscured by opium and its shifting of position may not be noticed until the physician directs attention to the change.

Of 80 patients 75 per cent. required opium for the pain.

Of 69 patients 87 per cent. say they had nausea or vomiting or both following the appearance of the initial symptoms. It is usually difficult to discover whether the nausea is due to the attack, or to the opium or other medicines commonly given.

Forty-two and one-half per cent. of the same patients describe a chill or rigor during the onset (not after abscess formation).

On 39 patients reporting on this point, 83 per cent. who

had experienced several seizures say that they became more severe; 8.5 per cent. say they became less severe; and 8.5 per cent. say the severity was about the same.

Fifty-five out of 94 of these patients had definite troublesome indigestion with flatulence or constipation or both at the time of operation.

Sixteen of the 55 belonged to Class 3 (persons presenting no history of definite attacks); and of these 16 quite a number sought relief from indigestion rather than from appendicitis. They had so complained for from one and one-half to fifteen years. All these 16 report their indigestion better (usually cured) except 2 operated on too recently for a report, and 2 from whom no report has been received. Some of the results in this class have been remarkably gratifying, patients writing that they have gained from ten to thirty pounds and eat anything with comfort. Perhaps half of this list had had a disgnosis of stomach ulcer from other physicians; and in 3 instances the pyloric and gall-bladder region was explored by me before the appendix was sought.

Twenty-nine of the 55 had had from two to twenty or more attacks, covering periods varying from one to eight years. Of these 29, all report the indigestion better except Nos. 127 and 132 (operated on too recently); No. 13, a confirmed neurasthenic, who may have mucous colitis but whose appendix was strictured; No. 19 whose indigestion antedated the appendix trouble; and No. 95 whose continued symptoms I do not explain.

Of the remaining 10 (of the 55) 6 were operated on during the first known attack, and the presumption is that their indigestion was not due to the appendix trouble (it is significant, however, that all 6 report their digestion improved, and 3 of the 6 report constipation and flatulence improved); for 2 (of the 10) the history is incomplete; for the remaining 2 the history is also incomplete, but six and nine attacks respectively were experienced and both patients report their indigestion better.

In a word, practically every person whose indigestion could by any reasonable interpretation of the situation be etiologically connected with the appendicitis was cured of that ailment.

Thirty-nine of the 94 denied troublesome indigestion.

Twenty of the 39 came to operation during or a few weeks after the first known appendix trouble; an additional 10 came to operation within twelve months of the first known onset; about 3 I have no information; the remaining 6 had suffered from four to twelve attacks covering periods varying from two to six years, and nothing explains their escape.

Replies are at hand as to the general health of 87 of these patients. Ten were operated on too recently for information to be of value; 69 say their general health is better; 1 says it is the same; No. 33, whose abscess was opened without removing his appendix, says he is only slightly improved; No. 35, whose bill has been due and unpaid for two years, says she is only slightly improved; No. 13, a confirmed neurasthenic (who gave a history, however, of definite attacks and who had a strictured appendix and who has been referred to as a possible subject of mucous colitis) is worse; No. 19 who had a very annoying indigestion before operation for acute appendicitis has more aggravated indigestion now; No. 34 has been confined since and says her general health is worse on account of pelvic trouble; No. 104, who had a gangrenous appendix, reports her general health impaired without apparent cause.

Sixteen patients answered that they have a numb area near the scar. Ten of the 16 had vertical incisions, and the numb area is on the left; 3 had oblique incisions and the numb area is on the right; in 3 instances the direction of the incision is not known and the numbness is described at the "bottom" in 1, on both sides in 1, and on the right in 1.

Seventeen patients complain of some pain or discomfort in the appendix region. All these were more or less acutely infected cases whose present discomfort may reasonably be explained as due to adhesions (or to the appendix remain-

ing in No. 33) except in cases of 5 persons, 2 of whom are neurasthenics and may have had other overlooked pathology (previously referred to); for the discomfort of the other 3 no explanation appears.

Six persons say that a hernia exists in the wound. I am inclined to think that a hernia is present in more than 6 instances because in the average drainage case attention was directed to the securing of ample drainage with very little attention to the prevention of subsequent hernia.

These patients have all been inquired of to discover if any unfavorable symptom has developed which was not present prior to operation. Two report that they are weak and nervous from overwork; 1 has been operated on since for cholecystitis; 1 is now suffering from the menopause; 1 has fissure of the anus; 1 is troubled with an unexplained diarrhea; and one complains of weighing ten or fifteen pounds less from no apparent cause.

In two girls, aged about sixteen years, the abscess was drained per vagina with excellent results. In one instance (a male) preparation was being made to drain per rectum when the abscess emptied itself spontaneously by this avenue.

One patient was known to be pregnant at about the tenth week. Operation was done because of several previous attacks and because of appendix warnings at the time. Her pregnancy was not interrupted.

During this period one abscess in the abdominal wall at McBurney's point was opened. The patient was a child, aged six years. There was no history of trauma and no known infection elsewhere in the body. The abscess lay underneath the external oblique. The peritoneum was not opened.

A perinephritic abscess was also drained in a boy, aged twelve years. It was very highly probable that a month prior to my seeing him he had suffered an appendix attack, and this view is borne out by a report that he has abdominal trouble of a suspicious nature since.

One patient was seen with very suspicious abdominal

pain. Between the time of my being called (the patient was out of the city) and my arrival he developed a cough. Evidences of bronchopneumonia were present, and other children in the family had measles at the time. Operation was not advised; on the following day the eruption of measles appeared, and on the second day the child died with symptoms distressing in both chest and abdomen.

Operation was declined in 3 instances in the belief that the patient had typhoid. Such developed to be true in case of 2 of the patients, while the third probably had tuberculous peritonitis. The leukocyte count was a deciding factor in all 3 cases.

DISCUSSION

Dr. W. M. Jordan, of Birmingham, Ala.—I would like to ask Dr. Jones, in closing the discussion, what incision he makes in these cases.

Dr. W. P. Carr, of Washington, D. C.—I am sure we are all pleased to hear a contribution as to what happens after operations for the removal of the appendix. I must say, however, I do not place much reliance on what patients tell me as to how they feel after operation. A good deal will depend upon what they ate for dinner that day.

Dr. Guy Leroy Hunner, of Baltimore.—Such an analysis as this which Dr. Jones has brought before us of his cases ought to be indulged in more frequently in considering some of these topics that seem rather hackneyed. It calls our attention to many things, and among them the fact that we get careless in our diagnoses. Perhaps, best of all, it makes of the man who gets up the paper a much better diagnostician than he has been before going into all the minutiæ of his cases. In intra-abdominal examinations we overlook some of the things we wish now we had looked for, and in our histories we leave out some little detail we wish now we had put down at the time. All these things make us more careful and scientific men after going over a series of cases as Dr. Jones has done. I think Dr. Jones is to be congratulated on this excellent paper.

Dr. Jones (closing).—In reply to Dr. Jordan, a vertical incision was made, always at the edge of the right rectus muscle.

NOTES ON THE TECHNIQUE OF SUTURING BLOODVESSELS WITH A NEW INSTRUMENT

By J. Shelton Horsley, M.D.
Richmond, Virginia

The history of successful bloodvessel suturing goes back only a few years. In no department of surgery is success so dependent upon an accurate following of technical details. The slightest break in asepsis, any undue roughness in handling the vessels, or the lack of mechanical accuracy means either immediate failure or else clotting and obstruction of the lumen of the vessel soon after the operation has been completed. The development of this distinctive branch of surgery has been fully described by Watts (*Bulletin of Johns Hopkins Hospital*, 1907, vol. xviii), and more recently by Ehrenfried and Boothby (*Annals of Surgery*, October, 1911, 485), and by Winthrop (*Southern Medical Journal*, November, 1911, 760). Carrel's work in demonstrating, in 1902, the essential features in suturing bloodvessels, is the real beginning of successful surgery in this field. He showed that strict asepsis, the utmost gentleness in handling the vascular endothelium, and accurate approximation of intima to intima are prime factors in suturing bloodvessels. He called attention to the fact that aside from immediate failure, remote clotting was due to some technical error, as wherever the endothelial cells of the intima are injured, either by trauma or by drying, clots sooner or later are very likely to occur.

It is the general opinion among surgeons that the suturing

of bloodvessels is exceedingly delicate work and may be done only by a favored few. In this way its usefulness has been curtailed, for emergency surgery, such as stab and bullet wounds of the vessels, furnishes the most fertile clinical field for this work, and those who do much emergency surgery are the very men who should be competent to suture bloodvessels. Any effort to simplify the technique should, therefore, increase the clinical usefulness of this procedure. In experimental work, after the general principles are mastered, such as placing the sutures and careful handling of the intima, the most prominent difficulty is managing the guy sutures. The necessity for changing hands and transferring guy sutures after suturing each third of the vessel, the chances of their being tangled, the maintenance of proper tension on the guy sutures, and the relaxation of the tension while changing from one-third of the vessel to the other, are likely to be confusing and to make the sutures irregular and faulty. Another very practical objection is the difficulty in obtaining the services of an assistant, trained in handling these sutures at just the time when such help is most needed.

In order to avoid these difficulties and in an effort to simplify the technique, I have used an instrument for holding the guy sutures in position. This instrument (Fig. 1) consists of a small steel shaft about one-sixteenth of an inch in diameter, which curves at one extremity into a shorter shaft. The long shaft, or handle, is six inches long, and the short shaft is one and three-quarter inches long. The short shaft is placed at an angle of 53 degrees to the long shaft. The curved portion is flattened out quite thin so as to form a light spring. There are five buttons: one on the main shaft as close as possible to the curve, one at the extremity of the short shaft, one and a half inches below this, and two on the main shaft at points about opposite the buttons on the short shaft. All of these buttons hug the instrument closely and are so constructed that the guy

Fig. 1.—The instrument for holding the guy sutures, as described in the text.

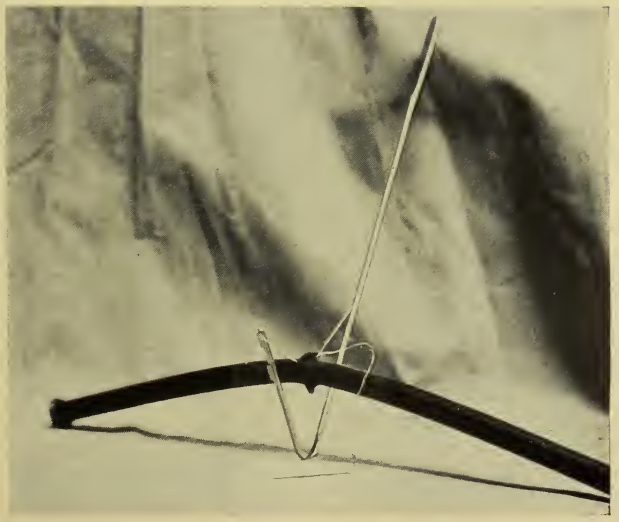


Fig. 2.—A thin rubber tube representing an artery with the three guy sutures placed and fastened to the buttons on the instrument. The circumference of the tube is made triangular by the tension of the guy sutures.

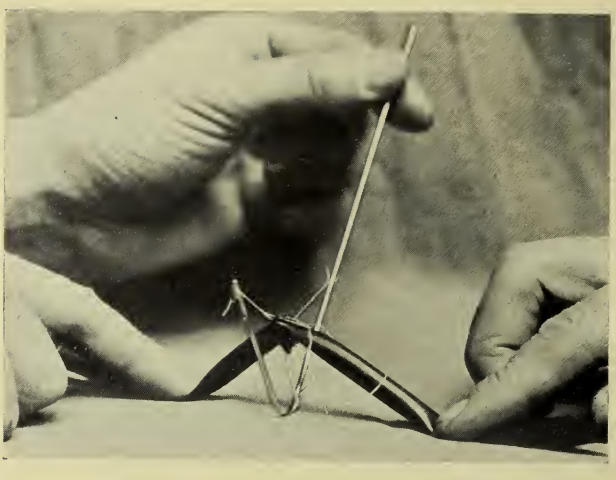


Fig. 3.—The handle of the instrument is upright and the continuous mattress suture has been started.

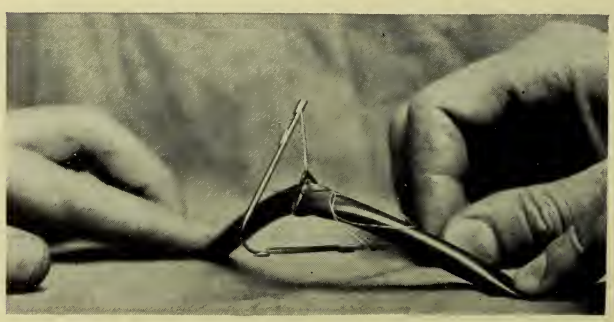


Fig. 4.—The handle is depressed until it is horizontal and points away from the operator. The second division is being sutured.

Fig. 5.—The handle of the instrument is depressed until it is horizontal—this time pointing toward the operator. The last division is being sutured.

Fig. 6.—The handle of the instrument has been brought to its original position and the suturing has been completed. The instrument is grasped between the thumb and fingers and compressed to relax tension of the guy sutures and demonstrate whether there is a spurting point along the suture line.

Fig. 7.—Specimen from transfusion of blood. To the right is the vein, to the left the artery. Note the small amount of thread exposed to the lumen.

Fig. 8.—Three specimens of arterial suture from dogs. The upper specimen was removed a few minutes after operation, the middle specimen two days after operation, the lowest one thirty-three days after operation. The two upper specimens are carotid arteries, the lower one is a femoral artery. For further description, see text.

sutures are held securely by merely wrapping them twice around the buttons.

The technique of suturing bloodvessels with the use of this instrument is as follows: The vessel is exposed and clamped on each side of the operative field with rubber-covered Crile clamps. It is divided with sharp scissors and the adventitia is pulled down over each end of the vessel between the finger and thumb and cut squarely off. The ends are washed out with salt solution in a medicine dropper. The ends of the vessel are then smeared with warm vaseline and three guy sutures are placed with a number sixteen straight needle and fine black silk. I untwist number one black Chinese twisted silk into three strands and use these for sutures.

After threading, the strand is secured in the needle by a single knot. The thread must be thoroughly anointed with vaseline before being used or may be boiled in vaseline. Three guy sutures divide the vessel's circumference into three equal parts and are passed by going from without inward near the end of the vessel, the point of the needle emerging from the intima. The needle is then carried to the other end of the vessel, which it penetrates in a reverse direction; that is, from within out, entering on the intima. These guy sutures are tied as they are inserted, using the ordinary knot. The ends of the suture are held taut while running down the second turn of the knot so as to prevent the first turn from slipping. The instrument above described is then placed under the artery with the short shaft toward the operator, and the bottom guy suture is wrapped twice around the lowest button on the main shaft. The ends of the suture are then cut close to the button so as to be rid of unnecessary thread. The upper guy suture near the main shaft is fastened by taking the end of the suture without the needle (the short end of the suture) and wrapping it around one of the two upper buttons on the main shaft. In vessels of ordinary size the lower of these two buttons

is used. The end of this suture that is threaded is not cut, but is left for future suturing. The third guy suture is wrapped around one of the buttons on the short shaft while this shaft is very slightly pressed toward the main shaft. When this pressure is released, tension is placed on the three guy sutures, and the circumference of the bloodvessel is pulled from a circle into a triangle and held rigidly in this position (Fig. 2). The suturing begins at the upper guy suture on the main shaft, that is, the upper guy suture farthest from the operator. The instrument is held with the handle vertical, and the long end of this guy suture, which has been left with the needle attached, is passed back and forth through the slightly everted lips of the upper third of the margins of the artery, after the manner of a continuous mattress suture (Fig. 3). The instrument is slightly elevated during this suturing, which still further increases the eversion of the margins of the vessel and renders it possible to place the sutures more accurately. The suturing is done toward the operator, and constant tension is kept on the suture by holding the thread in the left hand and so bringing the thread down snugly after each suture is placed with the right hand. The sutures are close together. In the carotid of a medium-sized dog, there should be about five or six sutures between each guy suture. When the second guy suture is reached, the handle of the instrument is depressed away from the operator until it lies horizontally (Fig. 4) instead of vertically. The whole instrument should then be slightly shoved toward the operator so as to increase the eversion of the intima in the third that is being sutured. The suture is continued along the second third of the vessel's circumference in the same manner as in the first, only care must be taken to place the suture at the angle well inside of the guy suture, as the latter may cut the vessel somewhat, and so cause leakage, and also because the vessel wall is pulled out more markedly at this point, which makes it necessary to take a deeper bite

here in order to secure uniformity in the line of sutures. When the third guy suture is reached the position of the instrument is again changed, the handle, or main shaft, being depressed toward the operator (Fig. 5). The position of the instrument now is such that the handle points to the operator while suturing the last third of the artery, which is exactly the opposite direction to its position while suturing the second third. The whole instrument is gently elevated to increase the eversion of the margins of the artery. The suture is continued along the last third of the artery, and when the starting point is reached the instrument is brought to its original vertical position. The suture is carried about two stitches beyond the starting point, and is there finished by whipping it over twice after the manner of an overhand suture, and running the thread under the loop before the loop is drawn tight. This holds the thread securely. The Crile clamps are then loosened gradually, the distal one first. The shafts of the instrument are grasped between the thumb and fingers and pressed toward each other so as to relax the tension on the guy sutures (Fig. 6). If any spurting point occurs the clamps are reapplied, the pressure on the shafts is relaxed and an extra suture is placed at the spurting point. This is rarely necessary in suturing arteries, though where a segment of vein is grafted on an artery a spurting point often occurs. If no point spurts, the guy sutures are cut close to the artery and the instrument is removed. The small amount of oozing immediately after the suturing is completed usually checks spontaneously, or at least after gentle pressure with dry gauze. If after slight pressure with dry gauze for a minute there is still any leakage of blood, a suture should be placed at the point of leakage. If too much pressure is made with gauze a clot may form. When the wound is closed the arterial suturing should be perfectly dry and free from any oozing.

In discussing the advantages of this new method, let us first consider the merits of a continuous mattress suture

in bloodvessel surgery. It is well known that in intestinal surgery the continuous mattress suture makes exceedingly smooth approximation on the peritoneal surface and a minimum amount of thread is left exposed. In the case of a bloodvessel the endothelial layer is on the inside of the vessel instead of on the outside, as in the intestines. The object in each instance is to approximate the endothelial surface and by applying the continuous mattress suture, as recommended in the above technique, we obtain the same approximation and minimum exposure of the thread within the vessel as is seen on the serous surface of the bowel after the application of a continuous mattress or right-angle suture. In bloodvessel suturing it is most desirable to have as little of the thread exposed to the current as possible, and this suture is more capable of fulfilling this requirement than any other continuous suture. In addition to this advantage there is less likelihood of the vessel being cut with mattress stitches than with other forms of suture. This property of the mattress suture is recognized in general surgery and is utilized in sewing such tissue as muscles when cut transversely; where a single straight suture will cut out, the mattress suture, which grasps a loop of tissue at a right angle to the line of traction, will hold.

The advantages of the instrument have already been alluded to. Of course, to obtain satisfactory results it must be properly used. The guy sutures should be of about equal length from the button to the artery, so that no undue traction is made on any one suture. If the guy sutures are of equal length, the tension of all of them can be increased or diminished by regulating the suture that runs to the end of the short shaft. If the short shaft is pressed upon too forcibly when the last guy suture is applied, so much tension will be made that the guy sutures may cut the vessel wall unduly. This is very easily regulated, and when once the guy sutures are properly placed the tension all along the arterial wound remains exactly the same from the beginning

to the end of the suturing. This insures uniformity of the sutures, and prevents the alternate stretching and relaxation that must occur every time the guy sutures are changed when they are held by the hand. No skilled assistant is required, and, in fact, a bloodvessel can be sutured by the operator without any assistance at all, as he can hold this instrument in part of the left hand, while the thumb and index finger of the same hand follow the thread as the sutures are placed. If a leak occurs it is easily demonstrated by loosening the clamps and relaxing the guy sutures by compressing the shafts of the instrument as described above (Fig. 6). The clamps are then reapplied and the leak accurately sutured with the vessel still held in the instrument. In this manner, any competent surgeon with some experience in experimental work on the arteries can confidently suture large vessels or perform transfusion of blood with a needle and thread. In both instances the same technique is used.

In transfusion of blood, where the artery of the donor is united to the vein of the patient, this method of suturing is particularly desirable. As pointed out previously (*Journal of the American Medical Association,* August 20, 1910) it is best to select a vein where a branch is given off. This branch is clamped with a mosquito forceps and will serve as a gauge to show the rate of flow. In my own experience, the flow in transfusion is more likely to be unsatisfactory because of contraction of the exposed radial artery than on account of blockage at the site of anastomosis. Of course, this can be largely avoided by keeping the vessel covered with gauze saturated with warm salt solution. But it is necessary occasionally to inspect the vessels, and, as a rule, the vessels are inspected oftener than is necessary and each exposure tends to increase the contraction. As the radial artery firmly contracts, it will almost shut off the flow of blood entirely. If this occurs when sutures are used for transfusion, a small probe can be passed through the venous branch, through the site of anastomosis, and up into the

radial artery, thoroughly dilating it. The probe must be perfectly smooth, and should be anointed with vaseline before it is introduced; it must be withdrawn quickly, when it will be followed by a spurt of blood. The venous branch is then clamped as before, and the vessels surrounded with warm, moist gauze. Such a procedure is impossible when a fixed cannula is used without the risk of seriously injuring the intima where the metal probe passes through the cannula. Suturing an artery or transfusion of blood can easily be done with this technique in ten or fifteen minutes after the vessels are exposed if the operator has had some experimental experience.

Suturing bloodvessels seems to be going through the same stage as intestinal suturing underwent fifteen years ago. At that time there were hosts of appliances of all shapes and descriptions for uniting severed intestines, but it was found that with a little practice a needle and thread were superior to complicated buttons and bobbins, and these appliances have been generally abandoned. It is not improbable that history will repeat itself in the case of arterial suturing.

A few specimens are presented to show the result of the continuous mattress suture. In all of these specimens this method of suturing was adopted. There was no evidence of clotting in any of them. The specimens from dogs show a carotid artery removed a few minutes after the suturing was completed, a carotid artery removed two days after operation, and a femoral artery removed thirty-three days after operation. In the first-mentioned specimen the suture line unraveled somewhat after being cut, as, of course, there was no time for healing. But both this and especially the two-day specimen show how little of the thread is exposed to the lumen of the vessel. In the specimen thirty-three days old more of the thread is barely visible, but it is entirely covered by intima. It is not unlikely that the same process goes on here as in healing after intestinal suturing, with

a mattress stitch, namely, as healing progresses the tube straightens out, the ridge of tissue caught up by the sutures gives away, and the sutures gradually stretch and work away from the endothelial surface. In the intestine this would be toward the mucous membrane, in an artery toward the adventitia. This would account for the suture being apparently longer in the thirty-three day specimen than in the other two. The specimen from a recent transfusion of blood also shows how little thread is exposed to the blood current.

CODIVILLA'S METHOD OF LENGTHENING THE LOWER EXTREMITY

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In 1903 Codivilla, of Bologna, published his first account of a method by which to accomplish elongation of a lower extremity which is abnormally short as the result of injury, disease, or malformation. The fundamental features of this method are that the distracting force, by which the elongation is accomplished, is applied directly to the skeleton by means of a nail or steel rod, which is driven through the os calcis, and that the elongation which is thus obtained is held, pending the accomplishment of the healing process by means of a dressing of plaster of Paris and steel bars suitably arranged. Since the time of this original communication of Codivilla's there have appeared articles by a number of European surgeons in which the same method has been applied with success and other procedures have been brought forward, notably by Steinmann, in which the nail or other appliance driven into the bone has been utilized as the vehicle for applying extension by weight and pulley to the extremity.

Passing by, as a matter of subsidiary importance, a considerable amount of controversial discussion which has appeared concerning priority of authorship and invention in the use of the nail driven into the bone, there would, nevertheless, remain for scrutiny an element of difference in the methods of Codivilla and Steinmann, which may perhaps be regarded as of fundamental importance. It

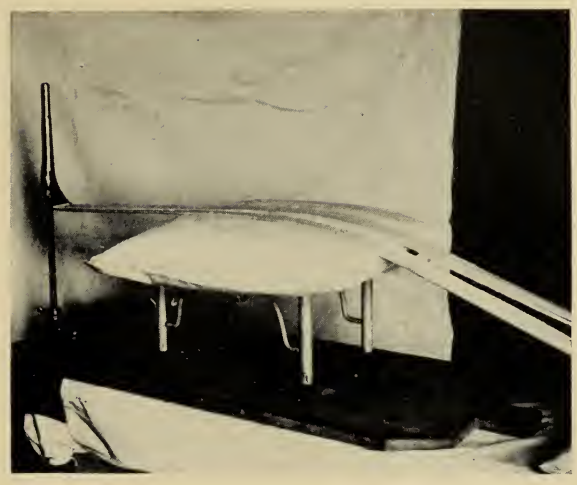

Fig. 1.—Langemak's pelvic support. Of special value when traction is to be made.

Fig. 2.—Arrangement of apparatus for making powerful traction on the lower extremity.

Fig. 3.—(From Codivilla's article.) Showing how the rod through the os calcis is maintained in traction by means of the slotted ferrules, fixed in the plaster dressing.

seems justifiable, moreover, to bring the subject to your attention, for the reason that it appears to have excited but little interest among our American surgeons up to this time. At first glance the chief divergence of the two methods might appear to lie in the skeletal point chosen by each for the application of force. Codivilla, in all cases, drives the nail into the os calcis, whereas Steinmann chooses the lower end of the distal fragment of a fracture for this purpose. We might agree with Steinmann in recognizing in his method the more direct and mechanically more efficient application of force, approving of the elimination of the ligamentous apparatus of the knee in femoral fracture; or we might look with favor on Codivilla's plan of avoiding the perforation of the lower end of the femur with its vital menace of infection and choosing for this purpose a more peripheral, smaller, and therefore less important bone, the os calcis. After this there still remains, however, a radical difference of mechanical character between the two methods, the recognition of which may result in a selection of the one or the other corresponding to the needs of the situation.

For the treatment of the usual fractures of the femur with a degree of displacement not excessive, we have no need of either method, since the extension by means of adhesive plaster or the Hodgen splint may be looked to for thoroughly satisfactory results. There are, however, many cases of very different character with which we are, at times, confronted. Such are the recent fracture of the femur with great longitudinal or axial displacement, resulting either from tremendous force or from the physical character of the break, or, on the other hand, the fracture which has healed solidly before the displacement has been overcome together with those cases not belonging in the category of fracture at all; cases of coxa vara and of congenital shortness of an extremity for example.

In the recent fracture, no matter how great the shortening, we have to overcome the resistance of powerful muscles

which have contracted to their full limit, it may be; that considerable force is required to accomplish this we all know. So do we also know, however, the remarkable effect of the constant pull of a well-applied Buck's extension. Once we get rid of the skin factor, necessarily involved in the use of the adhesive plaster, it is remarkable how great is the lengthening effect of twenty to twenty-five pounds, secured by means of weight and pulley.

However, in the second group of cases we are dealing with a very different condition in the soft parts; the fracture having been healed for a long time, the muscles have become structurally short and not simply functionally so. In some cases of long-standing coxa vara and congenital shortness of an extremity the inadequate length of the muscles is so evident as to require no further comment. Nevertheless, it has been shown that by the application of great force directly to the skeleton such structural shortness may be safely and satisfactorily overcome, especially if the procedure be carried through two or more sittings. The retention of the gain in length, under these conditions, by means of a plaster dressing carries with it the advantage of secure splinting at the site of fracture or osteotomy and in addition a much greater facility in handling the patient in bed and promoting his comfort.

Our attempts at applying plaster dressings in this manner in the past have been unsatisfactory, chiefly because of the impossibility of preventing decubitus at the dorsum of the foot and at the heel. This is entirely avoided by Codivilla's method of transfixing the heel. At the same time we are enabled to use degrees of force, with safety, far greater than was otherwise possible.

I present a brief description of the manner in which I have applied this method, since it differs from Codivilla's in the use of apparatus which is easily portable; Codivilla uses the Schede extension table, which is cumbersome, complicated, and, indeed, not met with in this country.

After open operation at the site of the healed fracture, sufficient to thoroughly liberate the ends of the fragments, or after doing osteotomy, in case this is required, the wound is closed and dressed as usual. The patient is now placed on a wooden table, to which has been attached the pelvic rest of Langemak. This rest is fashioned somewhat like the pommel of a saddle, thus presenting a broad smooth surface to the perineum as a medium for resistance against the pull to be made. The pelvis rests upon bands of heavy muslin, which, passing over the bench and pillow supporting the shoulders and head of the patient, are fastened tautly to the head of the table by means of large hooks. The lower end of the heavy rod on which the pommel rests is strapped to the legs of the table, in order to equalize the leverage and prevent canting backward of the pelvic rest. To this there is now added a traction rod, devised by Ridlon, of Chicago, which is movable at the table edge by means of a ball-and-socket joint. This, too, may be clamped to any wooden table. Traction is made by means of a powerful screw. Under careful asepsis, a sharpened steel rod is now driven through the posterior process of the os calcis. I have used for this purpose a well-tempered ice pick, divested of its wooden handle and sterilized in the usual manner. This is connected to the traction screw by means of heavy picture wire and a spring scale is included, to serve as a dynamometer. By turning the screw, traction is now made on the limb, the amount of force being read on the scale of the spring balance. Traction should be steadily increased until the reading on the balance remains stationary. This may require the use of from fifty to one hundred pounds, according to circumstances.

While maintaining the traction, a strong plaster dressing is now applied from the middle of the leg, to the waist; it should be well modeled about the pelvis and especially about the root of the thigh where the ischial tuberosity is utilized as a *point d'appui*. Special care must be taken to pad

well with heavy cotton wadding and felt, paying particular attention to the anterior superior spine of the opposite side and to the ischium. Before proceeding farther, this plaster dressing is allowed to become well set and hard. There are now to be attached to the lower end of the plaster dressing two steel ferrules which have been held ready for this purpose. Mine have been ten inches long, three-quarters of an inch wide, and made of three-sixteenths inch steel. Within one-half inch of the lower end of each ferrule there is cut a slot, one inch long and three-sixteenths of an inch wide. Transverse strips of tin are riveted to the upper ends of the ferrules, to be included in the plaster bandages by which the ferrules are attached to the plaster dressing; this attachment is made by slipping the slot of each ferrule over the nail so that the upper end of the slot impinges upon the nail. Once this additional plaster has set the dressing is complete and the traction rod is removed.

The ferrules now maintain the pull upon the os calcis through the nail which transfixes it. In case the lengthening obtained at this first sitting is insufficient, after the lapse of a few days the plaster dressing is divided, at the level of the break in the bone, by a circular cut; a Gigli saw may be well used for this purpose. The patient is placed again in the traction apparatus, the limb is drawn upon by means of the ferrules and the additional length is secured by including pieces of cork in the gap which is made in the plaster and further maintained by a few turns of plaster bandage. The second sitting may be done without the use of an anesthetic, although this has not been my practice. After three weeks, the nail is sterilized on one side by means of lysol solution, and is withdrawn. The ferrules may now also be removed and the plaster dressing is allowed to remain until healing of the fracture is beyond doubt.

While my experience with this method has been very limited, I have been impressed with the painlessness of the method and the ease with which it is carried out if proper

apparatus is at hand. I have had no difficulty in reducing a shortening of two and one-quarter inches after fracture of the femur to a bare one-half inch of shortening.

The patient was a boy, aged nine years, and the fracture had occurred five weeks before and was a spiral, of great obliquity and there was no appearance of callus. Under the anesthetic there was no difficulty in breaking up the union and for this reason no incision was made. While the end result was satisfactory insofar as one-half inch of shortening is of little consequence, the *x*-rays show the reposition to have been very imperfect and I believe that operative liberation of the fragments would have enabled us to get a result of faultless character in this case. However, I am not sure that the price paid for a diminished operative risk was too great.

Gocht, in 1904, described his "Combined Extension Plaster Dressing," offering it as a serviceable substitute for the use of the nail through the os calcis. In this method traction is made by means of adhesive plaster with a spreader below, 25 cm. wide. The plaster of Paris is applied while traction is being made, the foot, the leg, thigh and pelvis being well padded and included in the dressing. The adhesive strips are allowed to protrude through the plaster bandages passed about them so as to grasp them firmly. When the plaster has well set it will be found that the adhesive cannot slip back. For this reason traction is maintained and, according to Gocht, decubitus never occurs on the foot. I can substantiate the experience of Gocht, in this respect. On the other hand, this method will be found much less efficient in producing tractive effect because of its less direct application on the skin. I should use it again only in case of fresh fracture in which I desired to use plaster of Paris or in case it was not possible to employ Codivilla's method for some reason. It is much more likely to prove efficient in children than in adults because there is need of much less tractive force.

In conclusion I beg to submit:

1. That Codivilla's method constitutes a very valuable addition to our methods of overcoming shortening in the lower extremity.

2. That it enables us to use great degrees of tractive force, painlessly, and that it furnishes great ease in handling the patient.

3. That it has the great advantage of acting as an efficient splint at the site of the break in the bone.

4. That it is not necessary nor even the best method in managing fresh fractures.

5. That when it is indicated, it is superior to any method in which adhesive plaster is used as a means of producing traction.

6. That when used with care it is free from danger to the patient.

References.

Codivilla. Zeit. f. Orth. Chir., Band xii, 1903; Zeit. f. Orth. Chir., Band xxvii, 1910; Amer. Jour. Orth. Surg., 1904.

Steinmann. Zentralbl. f. Chir., 1907, p. 938.

Langemak. Zentralbl. f. Chir., 1909, p. 392.

Gocht. Zeit. f. Orth. Chir., Band xiii, 1904, p. 405.

A REPORT ON THE PROCEDURE OF OMENTOPEXY IN CIRRHOSIS OF THE LIVER

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In an endeavor to estimate the practical value of an operative procedure to correct imperfect function in organic disease, the conclusions of properly weighed experience far overmatch even the most scientific and rational theories. Particularly is this the case when the same theory can be made to work both ways. So as there is nothing new to be offered upon the subject under consideration, save from the practical side, I have a few facts to present, some coupled with suggestions and criticisms both pro and con, and some merely unbiased statistics.

Cirrhosis of the liver is best studied practically, according to Senator, as portal and biliary, or atrophic and hypertrophic. In portal cirrhosis the infection is by way of the vein, and in the hypertrophic form the toxins come through the hepatic artery. Almost all advocates of the Talma or Morrison operation regard the chances for improvement far better in the atrophic form, and particularly in the alcoholic variety. Rolleston finds the average age of death from cirrhosis to be forty-seven and one-half years, with an earlier tendency in the form due to alcoholism. The percentage of frequency is as five to two in favor of men. The abuse of alcohol is undoubtedly an active contributory cause of cirrhosis, as 60 per cent. of the cases reported by Owen were hard drinkers, but inasmuch as the specific

action of the cause of cirrhosis is not inflammation of the portal terminals, but a fibrosis of the liver structure, constricting the vessels, it is quite likely that all cirrhosis of the atrophic variety is a *mixed toxemia,* and the influence of alcohol is perhaps merely instrumental in inhibiting natural resistance.

The histology indicates that the fibrosis is general throughout the liver, and that as it increases it gradually cripples every function of the gland, and though latency and compensation occur in some cases, apparently spontaneously, in most instances when the condition has advanced to actual dropsy, it progresses rapidly to a fatal termination. The changes in the liver structure besides the fibrosis, which is mechanical in its effects, are chiefly degeneration of the cells, and as this condition advances not only does the danger increase with the obstruction, but the toxins which degenerated cells should eliminate or destroy, accumulate. A very important commentary on the Talma-Morrison operation is the suggestion of Rolleston, who declares that even when an anastomosis is made between the portal and systemic veins, so much of the blood carrying the products of digestion will be diverted from the liver that the undestroyed toxins in this digestive blood current will pass uncorrected into the system. He declares that such a collateral circulation loads so much additional work on the kidneys that uremia is a common complication. It would appear, however, upon deliberate speculation that this theory is overstrained, inasmuch as no anastomosis, however free, would be likely to divert any blood from the portal circulation that the liver would be prepared to receive, as only the overflow would be carried off in this way.

As a matter of practical surgery, in view of the uncertainty of our knowledge of the details of the functions of the liver spleen, and pancreas, as well as of the general metabolism in the digestive organs, these conflicting theories

we could well afford to disregard, if reliable statistics of carefully followed cases should show a fair percentage of cures in the essentially fatal lesion of cirrhosis. It is well known that cirrhosis may exist for years without ascites, which Rolleston thinks is oftener a toxemia, the result of liver failure, than of mechanical obstruction, and theoretically he believes that the improvement which takes place through the collateral circulation is due partly to the relief thus given to the engorged liver, that it may more satisfactorily destroy the toxins in the blood passing through it, in the first place, and in the second place, that the increased arterial blood supply through these adhesions would afford more nutrition to the liver, facilitate phagocytosis and encourage compensatory hypertrophy. This compensation undoubtedly would increase the period of latency and indicate in many instances a symptomatic cure. Undoubtedly the belief is well founded that relief to the contracted liver vessels by diminishing the amount of blood flow is a welcome one, and chiefly responsible for the temporary cessation of ascites. Rolleston's statistics show that death usually follows the development of ascites in about two months, and if, as other statistics abundantly indicate, relief to a certain extent follows omentopexy, in from 30 to 50 per cent., for at least a year or two, with from 12 to 15 per cent. of symptomatic cures, the ascites must be much oftener due to obstruction than to toxemia and when it is due to toxemia the condition is beyond the pale of hope. It is clearly out of propriety to discuss the anatomy of visceral anastomosis, as it has been fully described many times, hence reference only is appended. It is enough to say that as Floyd[1] and Sappey[2] have abundantly shown, the anastomosis between the portal circulation and the abdominal veins is easily made, so as to give mechanical relief to the liver (and the spleen if indicated), and that this is also further

[1] New York Record, July 4, 1903.

[2] Quoted by Corzon Annals, July 1907, p. 837.

supplemented by diverting the excess circulation into the newly formed adhesions about the liver, which serve to nourish the impoverished liver structures and establish a compensatory hypertrophy which helps to limit the toxemia, and protract the period of latency into years of comfort.

All authorities who have given any thought to this operation have agreed that it must be done as early as possible before the patient is too exhausted to stand it, but for a far more important reason, before such structural changes have taken place in the liver as will render it incapable of performing even such limited functions as may be consistent with the prolongation of life. When degeneration of the liver cells has progressed to such a degree as to allow the digestive toxins to accumulate in the blood beyond the power of the liver to correct, no good can possibly be done by diverting them again into the general system, and it is very probable that the occasional prompt death after the operation of omentopexy is due rather to the accumulation of these toxins than to any other effect of operative interference. The symptoms of cirrhosis before the occurrence of ascites become of great importance in the study of this condition, as the diagnosis in the preascitic stage offers the consideration of the operation of omentopexy a far wider influence. These symptoms are not in any degree characteristic, but may be so combined as to render the diagnosis pretty positive. A history of chronic dyspepsia, with perhaps recurring attacks of hematemesis, or of blood by the rectum, especially if complicated with jaundice, bloated countenance, harsh skin, and diarrhea and general debility in a young patient with alcoholic history will often enable the careful diagnostician to satisfy himself that exploration is indicated. Undoubtedly it will require a bold surgeon to advise omentopexy in the preascitic state of suspected cirrhosis until further confirmation of the value of the operation in the presence of dropsy has been obtained, but there can be really but one danger

of importance, viz., the loss of liver action on the part of the portal blood. What this danger is can only be estimated. When one reflects that latent cirrhosis is often consistent with pretty fair health and that with the occurrence of ascites failure is usually rapid, it appears a safe procedure whenever physical indications upon and in the liver, after exploration, indicate cirrhosis, to at once go on with steps to establish anastomosis. In the last thirty years we have seen the advance from an almost hopeless prognosis, in operations for carcinoma, neglected until all other treatment has been tried, to a promise of radical cure in from 20 per cent. to 40 per cent. of early operated cases. May it not be that an early relief given to degenerating liver cells may at least arrest the progress, or at worst, greatly prolong the period of latency in the now uniformly fatal cirrhosis?

With a view to getting some new practical points upon this subject I have sent the following queries to about 60 prominent operators:

1. How often have you employed the operation in any of its modifications?

2. Were you able to distinguish the variety of cirrhosis often enough to make any comparison?

3. Can you approximately give the stage of the disease often enough to make comparison valuable?

4. What was the per cent. of mortality, if any?

5. What per cent. of considerable improvement or temporary cure was obtained?

6. What approximately was the duration of the improvement or cure?

I have reports of 144 operations most of which have not been previously reported. The statistics thus obtained I have tabulated with the name of the operator, that due weight may be given. Almost all of these operators are members of this association whose reliability is well known to us all, and if the conclusions most logically drawn from

these reports are even half as promising as they indicate, the most pessimistic of us must get encouragement.

TABLE OF CASES

Operator.	Cases.	Died.	Cured.	Improved.	Not improved.	Not traced.
Crile	3	0	0	0	3	0
Bevan	4	0	0	1	3	0
Unsigned—one reporter	11	1	0	6	0	4
Ricketts	6	0	0	6	0	0
Finney	6	3	2	1	0	0
Morris	8	1	1	2	0	4
Carstens	3	0	0	3	0	0
Oliver	2	0	0	2	0	0
Ill	8	1	0	0	7	0
Winslow	1	0	0	1	0	0
Grant	3	2	1	0	0	0
Coffee	3	0	0	1	2	0
Deaver	2	0	0	0	2	0
Ransohoff	8	1	2	3	2	0
Ferguson	5	0	0	5	0	0
Frank	3	1	2	0	0	0
Dean	5	0	1	2	2	0
Unsigned	2	0	0	0	2	0
Mixter	2	0	0	2	0	0
Moore	6	0	0	6	0	0
Matas	6	1	1	4	0	0
Danna	3	2	1	0	0	0
Schachner	2	2	0	0	0	0
Mayo	12	0	1	7	0	0
Ford	2	0	1	0	1	0
Horsley	2	0	0	0	2	0
Sherrill	1	0	0	1	0	0
Reed	6	0	6	6	0	0
Bents	.3	0	0	2	1	0
Bonnifield	4	2	0	0	2	0
Willy Meyer	4	0	0	2	0	0
Richardson	6	0	4	1	1	0
Hayd	2	0	0	0	2	0

This shows a total of 144 cases of which 17, or about 11 per cent., died of the operation; 17, or 11 per cent., are reported as cured; 64, or about 44 per cent., improved; 32, or about 22 per cent., are not improved.

I briefly report three cases of my own: Mr. S., aged forty years; seen with Dr. Boggess. Previous history was

the characteristic one of progressive cirrhosis, but the patient had been up and about his work until about a month before I saw him. He was then attacked with a profuse hemorrhage from the bowel and also vomited some blood. He was so exsanguinated that he fainted, and his exhaustion and feebleness, accompanied by diarrhea, kept him in bed for about three weeks. After this time ascites developed and he was tapped in all three or four times before omentopexy was suggested. At the time of operation he was barely able to walk and was losing his strength daily. This was about ten weeks after the attack of hemorrhage from the bowel. The operation was the typical one of Morrison; a large amount of fluid ran away, the patient made a prompt recovery from the operation, no subsequent tapping was required, and now after nearly three years he is in apparently good health.

Both the others were hospital cases; old alcoholics; greatly depressed in general health, with extensive ascites, and had been tapped many times. Both were toxemic and one died on the sixteenth day from a breaking open of the wound when he was apparently recovering; the other died from exhaustion at the twentieth day.

It will be noticed also that the remaining 14, or about 10 per cent., are not traced. It is at least fair to presume that the same percentage of cure and improvement prevailed in this 10 per cent. as in the other 90 per cent., and thus the results are even a little better than those shown upon the face. The meaning of the word "cure" here is doubtless symptomatic, as it is not at all to be considered that the structural alterations in the liver were ever regenerated. The comments indicate that in all the cures reported the parties were well after a period of three years or more. Mayo writes: "The average of those who died was two years, and one of them lived five years." Winslow reports as improved one living a year and a half. Sherrill reports as improved one who lived

two years. Besides this it is evident that many of the improved were rescued from a dying condition and given a lease on life for a year or more.

All the cases of Carstens, Morris, Moore, Crile, Ricketts, Ransohoff, Hayd, Ferguson, Bonnifield and Ill are specified as very late and all suffering with ascites. Among the replies Murphy writes that he has been disappointed in the operation, and now thinks it inapplicable save in the early stage in young alcoholics. Deaver expresses himself as disgusted. Baldy believes the operation wholly illogical. A number of other men of wide surgical experience, such as Ochsner, Cordier, Peterson, Bovée, McElrie, write they have had no experience practically, but are ready to apply the operation at a suitable opportunity. Parke writes that he has done several operations but was unable to follow the cases and could give no data. I felt it useless to occupy time with a discussion of the literature of the subject, to which a good many references are subjoined. For many of these references I am indebted to the kindness of Dr. Merrill Ricketts.

From a study of these reports of the experience of some thirty-five careful surgeons, it seems fair to conclude:

1. That even in the condition of advanced liver degeneration and general toxemia, with resulting ascites, over 10 per cent. of symptomatic cures are obtained and over 50 per cent. at least are improved, comforted, and helped to months and years of life.

2. That as this advanced condition is often preceded by a year or more of latency, during which suspicious symptoms often declare the cause, early diagnosis of the lesion which will surely lead only to the grave, justifies exploration and repair, with a far better promise than can be hoped for later on.

3. That as it is not possible to be certain of the character of the cirrhotic lesion before exploration, the surgeon need not be deterred from the steps by any uncertainty as to its

applicability, as all forms of cirrhosis are fatal under the expectant treatment.

The conclusions of Park, stated in his *Modern Surgery*, seem to fit the indications fully. He says in substance: "If the indications produced by cirrhosis are met by a reasonably early omental fixation, there would seem to be a well-marked place for the procedure, and that inasmuch as these results can be no worse than the treatment by the expectant plan, with repeated punctures, the operation must be done, if at all, while the patient still has the strength and resistance to bear it."

As to the technique, but few expressions were given. Matas prefers Narath's operation, which consists[1] of making an incision below the ensiform cartilage, drawing up the omentum and stitching it in a pocket between the peritoneum and the skin, in the subcutaneous tissue and closing the wound so as to prevent hernia. The operation should be done under cocaine, as general anesthesia is very trying to patients in the extreme condition of ascites.

Mayo operates over the liver region on the right side as the first step, and taps later as may become necessary; and if the patient improves, and it seems required, he makes a second operation on the left side.

I found, on looking over the statistics, that in some modification or other the operation had been done in this country and Europe many hundreds of times, and a few times in the pre-ascitic stage. It seems wise to consider a different operation for the two stages—in the advanced cases, such as have heretofore been almost the only ones brought to operation—the steps suggested by Narath, under cocaine, seem the proper ones. If this is done in time the originator believes that the enlarged and dilated abdominal veins will be seen within a week's time, and very promptly a compensatory anastomosis will be established,

[1] New York Medical Record, November 16, 1904.

which will relieve the overtaxed liver and insure a latency long enough protracted to induce a symptomatic cure in a considerable number of cases. If, however, the operation is done in the pre-ascitic stage one must bear in mind it is a preservation of liver function (perhaps that of the spleen also) that is in view, and that it is desirable to provide a vascular scaffold about this organ which will furnish nutrition as that within is impoverished. Hence a more careful exploration of the viscera is necessary and the organs should be carefully examined by the eye as well as the hand. A free incision is made in the midline; enlarged transversely, as advised by Schiazzi if necessary, and after the surgeon has satisfied himself of the condition, he should irritate the peritoneal surfaces of the liver and spleen and the abdominal wall, by rubbing lightly with gauze, and then bring the doubled up apron of omentum well up between these surfaces and tack with catgut sutures in this situation. This will place the new adhesions well away from any danger of interfering with the intestinal circulation and will induce a free anastomosis, as well as provide for a compensatory hyperplasia about the liver and spleen.

LITERATURE

Floyd. British Medical Journal, 1903, i, 134.
White. British Medical Journal, 1903, i, 898.
Keen. Philadelphia Medical Journal, 1903, xi, 787.
Balfe. Queens Medical Quarterly, 1904, ix, 295, Kingston, Canada.
Wheeler. British Medical Journal, 1905, ii, 867.
Statemore. New York Medical Journal, 1905, lxxxii, 1011.
Monro. London Lancet, 1906, i, 1239.
Ketchen. Practitioner London, 1907, lxxix, 831.
Clay. London Lancet, 1907, xi, 1348.
Ransohoff. Lancet Clinic, Cincinnati, 1907, lviii, 882.
Lund. Boston Medical and Surgical Journal, 1907, clvi, 203.
Jelks. Hot Springs Medical Journal, 1907, x, 129.
Fowler. Brooklyn Medical Journal, 1905, xix, 278.
Cumiston. American Journal of Medical Sciences, 1906, cxxxii, 53.
Koch. Transaction of International Congress of Surgery, Brussels, 1907.

THE SURGICAL TREATMENT OF BRIGHT'S DISEASE

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Dr. Edebohls, in the paper which he prepared just before his death, and which I read for him in Chicago in June, 1908, said in his opening paragraph: "When, in 1901, I suggested treating chronic Bright's disease by decapsulation of the kidneys I placed myself under a moral obligation to report the results after a sufficient length of time had elapsed." And when he said to me on his deathbed, "I hope you will follow up this work of mine, and follow it to its completion, for every word I have said in this paper is 'the truth, the whole truth, and nothing but the truth,'" he placed me under an obligation which I consider so strong that so long as I live and remain in the active practice of surgery it will impel me to study the subject in the same scientific spirit that he brought to its consideration.

Racked with disease, conscious that he had but a few months, possibly but a few weeks, to live, he wrote to every patient he had operated upon, asking for a twenty-four-hour specimen of urine, and, if received, divided it into two or three different specimens, to be sent, initialed only, to as many different laboratory workers, in order that their examinations might be compared, to make sure he was not misled. When no report was received he either visited the patient, or his or her friends, and obtained the specimen, or ascertained when and how the patient died.

In this way he was able to trace all but two of the 102

cases he had operated upon up to the time of his report. As you all know, he died before his paper was published.

His own cases were tabulated up to May 31, 1906. From that time to the time of his death he operated upon six additional cases.

One decapsulation of the right kidney, the other kidney being done later by me.

Three for chronic diffuse nephritis: (*a*) *April,* 1907, at the Post-Graduate Hospital. This patient had anasarca and made a very complete recovery. She has since remained well, and has been through a normal pregnancy without any appreciable kidney lesion. (*b*) *June* 6, 1907. This patient has remained well, has married, and was in perfect health at the time of the last report, October, 1911. (*c*) *February* 14, 1908. Died April 8, 1908. During her stay in the sanitarium this patient showed some improvement in her general condition, passing an increased quantity of urine, with an increased excretion of urea, but she finally died in convulsions.

One decapsulation of the right kidney for chronic diffuse nephritis, *October* 3, 1906, the other kidney having been previously removed. This patient is still living, and urinary examination does not now show any sign of kidney lesion.

One November 6, 1907. Present condition unknown. I may still be able to trace this patient, but at the time of this report have not received any reply to my letters.

In addition to these, I have personally operated upon twelve cases. The results of these eighteen cases show:

	Cases.	Per cent.
Improved	5	27.8
Died within two weeks of operation	2	11.1
Died later (unimproved)	2	11.1
Cured	8	44.5
Unknown	1	5.5

Although there are two cases in this series that I class as "operative deaths," I do not believe that either of them was

affected in the slightest degree by the operative procedure. One was a redecapsulation, and he died just two weeks after operation. When I performed the first operation, on September 4, 1907, his case seemed hopeless, and I refused to operate unless his family were informed that, in my opinion, he would die on the table. After a careful consideration of all of Dr. Edebohls' cases and my own experience, they decided to take the risk. At this time this young man was twenty-six years of age, was water-logged; was having from one to two convulsions every twenty-four hours; was apathetic, anemic, and as unpromising a case as I ever operated upon, with a single exception, which will be reported later. At the operation his kidneys were found to be immense, but so soft and edematous that I was afraid to handle them. After very careful manipulation I was able to split the capsule, separate it from the kidney and cut it away. After a long postoperative convalescence (five months) he returned home to Massachusetts and taught school at night and occupied a city position in the daytime until after a hard period of unusual mental strain, almost four years later (May 1, 1911), when his edema and other symptoms returned. He then insisted upon being given the chance of a second decapsulation, and this was done May 2, 1911. His kidneys were found markedly contracted, surrounded by a thick (half inch, at least) capsule, which was difficult to detach. This capsule was traversed by a large number of small bloodvessels that seemed to enter the kidney substance. This would seem to corroborate Dr. Edebohls' theory that the improved condition of the kidney after these operations was due to a new blood supply entering the periphery of the kidney.

At first this patient improved. His general condition was better; he was less somnolent; his urine—which before operation was 875 c.c. in twenty-four hours, specific gravity 1010, urea 1.2 per cent.; albumin, large amount and with all kinds of casts—increased to 1010 c.c., with a urea output

of 1.6 per cent. on the eleventh day. From this time on his condition gradually declined until his death in convulsions on May 20, 1911. The phenol-sulpho-naphthaline test in his case showed 1.5 per cent. at the end of one hour, and the same percentage (1.5) at the end of the second hour.

The other case of operative death was the case referred to before. She had had nephritis for a long time. The first urine examination that I have on record was dated November 3, 1907. When she was brought to New York both pleural cavities contained a great deal of fluid. She had both peri- and myocarditis, and was having frequent attacks of dyspnea. In my opinion this case was too far advanced to be benefited by operation, but she had been seen by Dr. Edebohls in Havana and sent on to New York for operation.

After a long period of observation and treatment by Dr. William H. Porter (whom I called in consultation) and myself, in the hope of being able to improve the heart condition and get rid of the anasarca, a large quantity of fluid was withdrawn from the chest, and Dr. Thomas L. Bennett having examined her and decided that if the operation were done quickly and with the patient lying on the side rather than in the usual kidney position it would be possible for him to give her an anesthetic the operation was performed.

On the right side a retrocecal and extraperitoneal appendix was discovered, running over the kidney area, and this was removed before the kidney was brought into the wound. The kidney was then decapsulated, the patient turned over and the left kidney operated upon. The whole procedure, in spite of the necessity of removing the appendix and of preparing each side separately, occupied but thirty-three minutes. This patient lived but five days, and died during one of her heart attacks, the urine having increased in quantity, her general condition being improved, and an apparent increase in absorption of the extravasated fluid throughout the body giving hopes of more or less

amelioration of her condition. The operation in this case apparently had no effect upon the outcome.

Compared with Dr. Edebohls' statistics, this makes the operative mortality slightly more. In his 102 cases the immediate mortality was 10.1 per cent. In this series it is 11.1 per cent., or for the whole 127 cases a little over 10 per cent. This is very different from the mortality given by Dr. Morris Booth Miller in the *American Journal of the Medical Sciences,* September, 1911, p. 369. He says: "Despite an immediate mortality of 30 per cent., and 44 per cent. remote (within a short period), it cannot be gainsaid that the results of operative treatment have been other than hopeful."

In referring to the table it will be seen that our remote mortality in this last series of eighteen cases is, up to the present time, the same as the immediate mortality—11.1 per cent. This is a rather striking difference. He does not indicate, however, in any way in his paper from what sources his statistics are derived; and if they are taken from general literature they can hardly be considered as correct, because the mortality must of necessity be much greater in the hands of inexperienced operators than with those who are accustomed to operating upon these cases.

Of the improved cases, one was a decapsulation of one kidney, which was improved, and eighteen months later a decapsulation of the left, with ultimate cure. This patient has been seen within two months and shows no signs at the present time of kidney lesion.

One was a chronic parenchymatous nephritis, improved for four years; redecapsulation and death.

One, a man from Texas, who had an advanced parenchymmatous nephritis, with a great deal of hemorrhage, so that he was rapidly becoming exsanguinated, who was operated upon in January, 1909. At the time an exploration of the kidneys showed no cause for the hemorrhage except the intense congestion, no stone or tumor being present. The

hemorrhage ceased immediately after the operation. He has gained between twenty and thirty pounds in weight, and has been actively engaged in business since his return home, about six or eight weeks after the operation; but his last urine examination shows a trace of albumin and some hyaline casts; he is, therefore, classed as an improved rather than a cured case. So far as his general condition is concerned he seems to be perfectly well, but as I believe we should apply Edebohls' rule strictly, he cannot be classed otherwise than as improved. This rule is as follows:

"The urine must remain free from albumin and casts, and the daily urea output be normal (or approximately so) for a period of at least six months following the verification of the disappearance of the albumin and casts, and the patient must be free from the symptoms of chronic Bright's disease from which he or she formerly suffered."

Of the other two classed as improved, one was done during the last summer, and was a man from Baltimore, from whom I have had no urine for examination since his return home. Clinically, he is better, since he has been able to return to business, has no hemorrhages, and considers himself so well that he has been neglectful in supplying me with specimens for examinttion.

The other, a case of Dr. Arthur F. Chace, of New York, was also done within two months. He had been treated in a neighboring city for a long time, and was finally brought to the Post-Graduate Hospital, but, in spite of all medical treatment, was progressively and rapidly becoming worse. At Dr. Chace's request I operated upon him, and he was discharged from the surgical service December 10, 1911. He still has albumin and casts. His general anasarca, however, rapidly disappeared following the operation, and he has been around the hospital for some time. He is still improving, but the ultimate outcome cannot yet be told. There is no question, however, but that the operation saved him from rapidly impending death.

Miller has said in the article already quoted that "in the majority of cases of the recoveries the physiological cure was complete in from thirty to thirty-five days." This, however, does not correspond with either Dr. Edebohls' or my own experience. Edebohls said:

"That some who are either unable or unwilling to believe in surgical treatment for chronic Bright's disease have explained the immediate good effects of renal decapsulation —the return of color and strength, the disappearance of dropsy, headaches, backaches, digestive and circulatory disturbances, the improvement in the condition and action of the heart and cerebrospinal centres—undeniable and striking as they are, to the rest in bed for three weeks subsequent to the operation. The fact is ignored or overlooked that many of these patients who were so greatly benefited by operation had already spent months and in a number of instances even the greater part of the year at a time in bed, without experiencing the slightest improvement. The changes in the patient's condition and general health after the decapsulation, on the contrary, are nearly always impressive and in some cases simply marvelous. The improvement, moreover, is progressive, continuing and increasing even after the patient has left his bed and resumed his place and work in life. . . .

"The cure of chronic nephritis is only started by renal decapsulation, and the element of time is essential to obtaining the full advantages of the operation. In some patients the health of the kidneys is restored in a few months after operation, while in others the same result is reached only after a period of three years."

This statement is confirmed by this last series of cases. One of my patients—operated upon seven years ago, and who spent the night after her operation wandering about the hospital in nephritic delirium, then remaining comatose, with occasional convulsions, for almost two weeks—did not

get rid of a trace of albumin and occasional casts until after two years had passed. She is, however, still living and well, and free from all signs of kidney disease.

Another patient, who was operated upon November 19, 1908, and who was rapidly dying of interstitial nephritis, did not show a clear urine report until last spring, and has but just fulfilled the requirements necessary to put him down as cured. His urine examination was practically normal for the first time on May 25, 1911. On December 5, 1911, the urine was examined in another laboratory in order that we might have an absolutely independent opinion, with the following result:

Specific gravity, 1023; reaction, acid; albumin, heat, nitric acid, and Esbach's reagent, negative; sugar, negative; urea, 2.3 per cent., 397 grains in twenty-four hours; indican, normal; microscopic examination—casts, none; crystals, none; epithelium, occasional vesicle cell; blood, none; pus, very occasional pus cell. There were a few microscopic mucus shreds or cylindroids present.

Of the eight cured cases there is very little to be said. One has remained well for seven years, and the last for a little more than six months. To all of them Edebohls' rule has been strictly applied, and the only comment that seems necessary in this connection is on the increased percentage of cures as shown by this series of eighteen cases and the percentage shown in Dr. Edebohls' paper—44 as against 33 per cent. This is possibly only a coincidence, for with a larger number of operations, many of them done with the patient almost *in extremis,* one may expect to have a larger mortality sometimes than at others.

As this paper is only intended to be a report of the work done in chronic Bright's disease in our office since the publication of Dr. Edebohls' last paper, this is neither the time nor the place for the discussion of the different theories which have been advanced to explain the effects of surgical intervention in Bright's disease. Miller, in his paper, how-

ever, has suggested some facts that are worthy of comment, and that, to a certain extent, clarify the situation.

In the first place, he says that "albuminuria is not *per se* an evidence of Bright's disease, though the etiological factors back of it will, in time, if not removed, occasion those tissue changes in the renal substance which characterize that disease." None of the cases, either in Dr. Edebohls' former paper or in this last series, has been done for simple albuminuria. We should not consider that an indication of chronic nephritis. In every instance there has been a disturbance of the general physical condition; an abnormal urine examination, including albuminuria; presence of casts, abnormal specific gravity, and an abnormal urea secretion. In addition to this, the renal function has been tested in the recent cases by the phenol-sulpho-naphthaline test, and, according to that test, in the last case operated upon and transferred back to the medical service within the last few days an absolutely fatal issue was indicated. Miller further says:

"Albuminuria may be divided into two classes—(*a*) where the cause is confined to the kidney itself, and (*b*) where the responsible factor is systemic. In the first class may be placed (1) local causes, as wounds of various kinds; (2) renal and perirenal infections; (3) irritations arising from stone or nephritis; (4) malformations and displacements which interfere with normal circulation."

In each and every form of what may be termed local nephritis "the only sound method of relief must be surgical since, with mechanical causes, we require mechanical measures to accomplish a cure." He considers that unilateral nephritis is due to some local cause, such as he has classified, and then he adds:

"I am familiar with no postmortem findings which would tend to confirm the suggestion that nephritis is ever one-sided, and that there is no reasonable hypothesis why the systemic causes of albuminuria should fall upon a single kidney."

We must agree in the main with these conclusions, and yet it is an undeniable fact that in some of our cases we have found a unilateral nephritis without any apparent systemic cause, and without being able to determine any local etiological factor.

It still seems to me, therefore, that it is advisable to follow out the practice that Dr. Edebohls and I have adopted in this series of cases—of always decapsulating the other kidney when a nephritis is found on one side without any local apparent reason for the change—for it is reasonable to suppose that occasionally a systemic cause may act primarily on one kidney and the other one become involved later.

There is one other point that should be emphasized in this connection—namely, that we cannot hope by surgery to replace any already destroyed renal tissue. As Porter has said: "The lesions of Bright's disease can never be cured to the eye of the pathologist and histologist, but to the physiologist and clinician the cure of the disease in a physiological sense is both possible and probable."

It seems to me, therefore, that the position taken by Dr. Edebohls remains the correct one.

Tyson, in the *New York Medical Journal,* July 8, 1911, reported four cases that had been submitted to operation, but was unable to report a cure in any one. Notwithstanding this he says:

"I claim that the operation is so serviceable in certain instances that it ought to be done more frequently. The conditions which demand it are not far to seek or difficult of recognition. They are simply these: Stubborn persistence of symptoms, causing great inconvenience or danger to life, such as permanently obstinate dropsy, which refuses to yield to the ordinary treatment thoroughly carried out; uremia, manifested by convulsions or other unmistakable signs, such as intense headache; anuria and large albuminuria, resulting in anemia and loss of function and strength;

obstinate hematuria; perinephritis, with miliary abscesses; hydronephrosis, and pyonephrosis."

Renal decapsulation is indicated in all varieties of *chronic* nephritis in the absence of conditions absolutely contra-indicating any surgical procedure.

In this paper I have made no attempt to review the now very extensive literature on this subject. This would extend the limits of the paper far beyond the time allotted me, but I hope to be able to take up this part of the subject at some later date.

WHAT CAN SURGERY DO FOR GASTRO-ENTEROPTOSIS?

By Joseph Ransohoff, M.D., F.R.C.S. Eng.
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In the ever-widening borderstrip between medicine and surgery across which the internist and the surgeon regard the maneuvers of each other with interest, or possibly with suspicion, stands the unfortunate visceroptotic knowing not whither to turn. Passive from birth, through heredity, or by natur-anlage, he, or oftener she, is pushed from one to the other, and knows not where to land. Read the report of the combined meeting of the American Obstetrical and the American Surgical Association in the *Transactions of the American Surgical Association,* 1910, and it will appear that the patient with visceral ptosis has been definitely given a passport to the domain of the internist from which the orthopedist may yet get him by requisition. It is to be regretted that ptosis of the abdominal viscera was always considered by Glenard as only a part phenomenon of a very complex condition. There can be no question but that in very many cases this is true. Then, if it is not congenital, it develops early in life, is distinctly hereditary, and is unmistakable in its manifestations. A young woman, more rarely a male, without any of the pathological causes of tissue relaxation, has stooped shoulders, a dry skin prematurely wrinkled, breasts pendulous, and an abdomen flabby, like that of a woman who has given birth to children; hernial apertures open with uterus lowered and retroverted,

with stomach dilated, a low kidney, and a general tissue insufficiency as often manifested, for example, by a condition which does not seem correlated, namely, a flat foot. The circulation is poor, the muscles even in action are feebly outlined. The patient is habitually tired, psychically depressed, usually pessimistic, in short, a confirmed neurasthenic. Here is a condition which might well be termed "panoptosis" and in which surgery can offer but little.

There is, however, another large class of cases in whom the neurasthenic state is associated with some distinctive visceral displacement, either pelvic or abdominal, the local effects of which are easily undervalued or entirely lost sight of in the flood of phenomena vaguely called nervous. To dwell upon the latter is beyond the purview of this paper. But it is because of their preponderance that only too often the sufferers are passed from one specialist to another without obtaining the careful analysis of their cases to which they are entitled. It is manifestly impossible to dwell on all the visceral ptoses in the time allotted me, and I shall limit my considerations to those of the gastro-intestinal tract. But one feature is common to them all, namely, that the nervous habit is as easily acquired and becomes as easily fixed in the visceroptoses as the universally recognized epileptic habit in which even after the successful removal of the cause, as, for example, from depressed fracture, the condition soon recurs. If anything is to be accomplished at all for the relief of the nervous manifestations of visceroptosis, the measures that are indicated in the individual case should not be delayed.

The contention is often made that neither the local symptoms nor the general manifestations of a visceral ptosis are proportionate to the degree of the displacement. This cannot be questioned. Again and again a woman with a complete prolapse of the uterus will suffer less than another with a relatively slight retroversion. The movable kidney that can be displaced from the loin to the pelvis will often

produce no symptoms at all, while another one that moves but little beyond the normal limits by reason, for example, of an anomalous vessel, may give rise to very painful and even serious obstruction, which nothing but operation will relieve. A stomach which by prolapse occupies the upper pelvis may perform its function perfectly, whereas, another much less prolapsed may, through loss of tone, be greatly impaired. A mobile cecum and a prolapsed colon may give no evidence whatever of their presence and be discovered accidentally at operation, and then even have their causative significance of the symptom complex completely overlooked. It certainly has been the experience of every surgeon that a long, freely movable, and nearly or quite normal appendix has been removed on the diagnosis of chronic or recurrent appendicitis. Indeed, the suspected offending organ may be normal in every regard. They are the cases without the history of acute and febrile attacks, and in which the predominant symptoms are evanescent, colicky attacks, ill-defined gas pains in the lower right quadrant, and above all, constipation, with the endless train of nerve symptoms which it so often begets. If the pains recur after the operation, as they so often do in these cases, we lightly ascribe them to adhesions or regard them as manifestations of neurasthenia. We remember these operations as easy ones, because the cecum, although perhaps at first not readily found because the ascending or transverse colon would get in the way, could, when found, be easily drawn into the wound together with a good part of the ascending colon. They are the easy operations for appendicitis. It is not only in the multipara that this condition is found, but often in young children and the adolescents of both sexes. In its symptomatology the condition greatly resembles the pseudo-appendicitis of Nothnagel. What actually occurs is a ptosis of a mobile cecum, of a mobile ascending colon, or of both. In still other cases the cecum is enormously distended, veiled by these vascular adhesions and bands, and perhaps

covered by a long, pendulous ascending or transverse colon. The following is a case in question.

Mrs. T., aged forty years, the mother of three children. Has for at least eight years suffered from obscure pains in the lower right abdominal quadrant. Has always been the subject of chronic constipation. Headaches were of frequent occurrence, and at times, when the constipation was especially prolonged, she had attacks of vomiting. The severe pains were paroxysmal in character and were believed to be due to a loose kidney. The course of the disease was afebrile. Relief had been sought by the patient at many hands, but without success. She had become a neurasthenic. The statement was made that during her paroxysmal attacks a painful swelling appeared in the right lower quadrant, which was believed to be the distended prolapsed kidney. Urinalysis negative. Ureteral catheterization, with a leaded catheter and radiography revealed a phlebolith one-half inch removed from the ureter. On the right side there could be moved under the examining fingers the distended head of the colon, from which, under pressure, the contents escaped. The operation revealed a normal appendix, the cecum and lower portion of the ascending colon enormously distended and in the lower part distinctly movable. Velamantous injected adhesions so well described recently by Jackson and Gerster on the surface of the cecum, and one band distinctively obstructive in its effect stretched like a wire over its front. With the division of this band and all the lesser ones in reach, an ocular and aural demonstration of its obstructive effects was given by the emptying of the colon with a gurgling sound. The operation was completed by the removal of the phlebolith from the pelvis, which was easily accomplished.

Except for the phlebitis found in this case, the condition described is not an unusual one. For example, Dr. Greiwe has recently reported that of a woman, aged forty years, who from childhood had attacks of colicky pains with the

history of abdominal pains. As far as she could remember she had severe headaches. In one year she was reduced from 190 to 130 pounds. The appendix was removed during an attack some six months ago, and at the time of operation the colon was distended with fecal matter to its utmost capacity. Improvement did not follow. The tracing of the bismuth meal by radiography shows the motile function of the stomach to be normal. But after twenty-four hours the cecum is still distended with the bismuth mass, and the ascending colon shown to be of an unusual length. The transverse colon shows unusual angulation. Not until forty-eight hours after ingestion of the bismuth meal is it finally in position to be expelled.

Experiences are multiplying to show that although the appendix still occupies by far the first role as an etiological factor in acute affections of the ileocecal region, there are many cases in which it is subordinate in importance. This, notwithstanding the dictum of Kelly that "primary typhlitis is among the rarest of diseases," and the remark of Deaver that "stercoral typhlitis may occur," I do not deny. That it does occur, I do not believe. If, with a seemingly normal appendix, conditions such as have been described are found, we must look to another cause. Just as non-perforative affections of the gall-bladder, of the stomach, or of the uterine appendages can produce peritoneal adhesions, so a malplaced distended colon, notably the cecum, as a result of fecal stasis, gives rise to the veiled adhesions. The removal of the appendix alone can relieve neither the local condition nor the attendant train of nerve symptoms. In view hereof it becomes questionable to my mind whether the very short incision now so universally made in the interval appendix operations is the best to use in all cases. Surely in the cases under consideration more room is desirable both for exploration and for instituting the necessary remedial procedures.

This brings us naturally to the prolapse of the colon with

its angulation, its long history of indistinct, ill-defined abdominal symptoms, its constipation, and its far-reaching sequelæ. There are few who follow where Lane has led. But we are indebted to him for a clear, explicit, and bold pronouncement of the causes, and dire local and general results of fecal stasis. No one else has so clearly portrayed the deleterious results of colonic auto-intoxication. More than any other he has clarified our understanding of the progressive nature of a malady in which, according to its severity, the operative procedures to be undertaken must be proportionate. I might here allude to the operation of Hofmeister, performed by him in 21 cases with uniform success. He terms it cecotransversity. It is an anastomosis between the cecum and the pendulous transverse colon, and since it is designed to circumvent the angulation at the hepatic flexure, it certainly deserves much consideration. The excision of the enteroptotic colon will certainly not become, to say the least, a popular measure. Nor is it in most instances necessary. Even the sidetracking of the colon by an anastomosis is, as a rule, superfluous. Suspension of the colon with as little reefing as may be necessary will answer every requirement. To make it effectual, however, the suspension should not be made by attaching one peritoneal surface to the other, unless the sutures are passed through the fascia of the abdominal wall. It is better even to divide the peritoneum, expose the fascia from within, and then to sew the omentum in the space thus denuded. The lesson learned that peritoneal adhesions are readily stretched when peritoneum is sutured to peritoneum, as in the ventral fixation of the uterus, has a practical bearing in the fixation of the colon.

Every case of enteroptosis merits careful study, for their variations are manifold. In this study, radiography merits the first place in diagnosis, and without it any operation for fecal stasis is made in the dark. Recently I saw a man, aged forty years, neurotic, constipated for years, with

suffering of indistinct character in the lower left quadrant. A tumor mass could not be felt, there was no tenderness, nor did repeated examinations show occult blood. A half dozen *x*-ray plates, which were taken, all showed a V-shaped pendulous colon, in which the bismuth was never found. The operation revealed a tight band, the cause of which could not be elicited, nearly shutting off the descending colon from the sigmoid flexure. It was lifted on a spatula, divided, and excised, and the lower segment of the descending colon freed. The constipation and the pain have been relieved, and with them have gone the concomitant general symptoms.

Gastroptosis. The inspiration to write this paper was given me by the appearance in my office of a young woman, aged thirty-one years, on whom four years before I performed a gastrosuspension with gastroplication. Before that she had run the gauntlet of specialists without avail. Postprandial distress, eructations of gas, occasional vomiting, persistent constipation, and so on, had been complained of for fully seven or eight years, had reduced her in weight, and had played havoc with what I was told was naturally her sweet disposition. The birth of a child did not mend matters, nor make them worse. When she entered the hospital she weighed 96 pounds. The *x*-ray taken by Dr. Lange revealed a fundus resting on the iliac pan. It looked like the flabby cheese bag of long ago. A picture taken two hours later showed the contents scarcely changed. The gastric atony was most marked, and fully two-thirds of the ingested milk bismuth meal were still in the stomach twelve hours later. The stomach held two quarts of fluid comfortably and without revolting. A gastropexy or rather an omentopexy with gastroplication was performed. The *x*-ray pictures taken a week later showed remarkable results. The stomach was in the best vertical position, with the pylorus low. Within five minutes of the ingestion of the milk bismuth, the motile function was in action. The gastric

wall fitted to its contents like the skin to the sausage. This woman has continued well, does all her own housework, and is unconscious that she has either a stomach or nerves. Incidentally her normal weight is between 115 and 120 pounds.

There is hardly a branch of medicine in which radiography is as helpful as in the one under consideration. The old classical anatomical illustrations, so familiar to us all, of the transverse or oblique stomach, do not correctly represent the viscus *in vivo* and at work; nor do the internists fairly show its every-day working capacity when they analyze what it can do with a test meal, a piece of toast, a small piece of steak, and a glass of water. A stomach may be able to dispose of this and secrete the conventional 2 per cent. of hydrochloric acid and still be totally inadequate to the ordinary demands made on it in the every-day mode of eating and drinking. The merit is the radiologist's, who has shown us the wide variations in the position of the stomach in the normal individual, and the speed with which it all but shoots its contents through the relaxing pylorus. The biographical illustrations by Cole make this process marvelously clear.

Deficiency of gastric secretion, while doubtless important, is less so than motor insufficiency, since the ingested foodstuffs are subjected to their chemical influence in the small intestines, whereas the motor insufficiency cannot be compensated for and must, if long continued, lead to gastrectasia, the symptoms of which need not be here enumerated.

To bring out the position and motor function of the stomach, I believe that the pictures should be taken in the upright posture, that being the one in which the stomach normally does its work. There is a tendency among clinicians to divide gastroptoses according to the degree of the prolapse. The extreme cases being those in which the greater curvature is in the pelvis and in which even the pylorus may become a pelvic organ. Any attempt to

classify them as a basis for operative therapy is, in my judgment, ill-advised, because very many stomachs are markedly prolapsed without any disturbances of digestion. Indeed, gastroptosis of even a marked degree is far from an uncommon condition, both in men and in women, in whom the gastro-intestinal functions are perfectly performed. More important than the position of the stomach is its tone, as shown by the *x*-rays, and particularly the presence of what is akin to an antral sphincter, which shows itself by a constriction some inches removed from the pylorus. Quite recently MacLaren called attention to a number of these neurasthenic cases in which the appendix had been removed without benefit. Here, as in most gastroptotic cases, a temporary relief is given by putting the patient in the recumbent posture after eating. In just such cases as MacLaren describes, where the appendix has been removed, it has been conclusively shown that the gastroptosis is secondary to a mobile cecum or prolapse of the colon. In considering gastroptosis I think we are justified from *x*-ray findings in dividing them into two classes. The first, in which the stomach retains its vertical position and the pylorus, although prolapsed, still occupies a low point. In the second class of cases the stomach occupies a transverse or oblique position, in which the cardiac end and the fundus are greatly depressed with the pylorus on a higher level. In the second class of cases even if the prolapse is of medium degree, the functional disturbances are very much more pronounced, because of the angulation which occurs at the gastro-duodenal junction, and because the chyme mass must be lifted uphill.

The all-important question of the relation of the nervous conditions and of gastric disturbances to each other can only be here touched upon. Suffice it to say that the influence of the nervous system on the digestive functions, beginning with the salivary secretion and ending with the rectal sphincters has been recognized from time immemorial.

To make them responsible for the chronic inactivities of the stomach and colon is not warranted by this physiological relationship. Moreover, the baneful effects on the nervous system of gastro-enteroptosis have been removed by operation sufficiently often and permanently to warrant, in my judgment, the retro-active effect of such visceral displacements on it.

There is a German adage, which seems applicable to the question of treatment of gastroenteroptosis. It is, "Where there is no plaintiff there can be no judge." In other words, a gastroptosis accidentally discovered should be let alone like similar nephroptosis. When, however, it gives rise to functional disturbances, which make for invalidism after reasonable efforts of conservative methods have failed, it is my judgment from an experience now of 21 operations for gastro-enteroptosis, that operation may be resorted to with at least a fair prospect of permanent relief. In this operation cognizance must, of course, be taken of the relaxations of the abdominal wall and of possible breeches in the pelvic floor. Since with the gastroptosis there is so often a prolapse of the middle colon, the incision in the middle line should not be too sparing. Particularly when the abdominal wall is greatly relaxed with diastasis of the recti, a long incision permits a plastic operation on the abdominal wall, which by restoring its integrity and tone will go far to support the plastic work done within. In suitable cases the muroplasty of the abdominal wall merits equal consideration with that of the pelvic floor in the visceroptosis, due to its tears or relaxation. A long incision, furthermore, permits free exploration, and facilitates the technique of such displacements as may be found. The following case may be cited in illustration:

P. W., aged forty years, was admitted to the Jewish Hospital on March 20, 1910. For many years he had been suffering from abdominal distress, notably after eating. There never was any sharp pain. Only at times were they

cutting in character. The nature of the food did not influence them. There was always a sense of bloating, with gas eructations. The latter disturbed him very much, and at times became uncontrollable. At infrequent intervals he vomited, and headaches were of frequent occurrence. Constipation was habitual, no movement occurring without the use of cathartics or enemata. He was frequently unable to follow his business pursuits, had difficulty in breathing at times, and suffered from sleeplessness. Present condition: Anemic, fragile-looking adult, weight, 103 pounds. Is prematurely gray. There is a slight subicteric tinge of the skin. Heart and lungs normal. Urinalysis negative; stool examined for blood, examination negative. On pressure there is some tenderness in the epigastric region. The liver appears somewhat mobile, and the dilated gall-bladder can be readily mapped out. The stomach analyses, which had frequently been made by a number of specialists, showed an atonic stomach without any evidences of ulceration. The *x*-rays taken by Dr. Lange showed a gastroptosis with the fundus reaching to near the iliac crest and the pylorus on a higher level opposite about the fourth lumbar vertebra. The axis of the stomach was nearly transverse. The transverse colon was in the pelvis and angulated. The operation in the median line permitted the fixation of the stomach and colon by omentopexy, gastroplication, and the drainage of the distended gall-bladder. Although it would have been easy to duplicate and shorten the suspensory ligament of the liver, as has been done by a number of German operators, I believed this step unnecessary. This patient made an uneventful recovery. He weighs 130 pounds, eats whatever pleases him, and the stock of cathartics which he had on hand has not been diminished since the operation was performed.

There is no better judge of the nerve and mental state of a man than is his wife. In answer to my request as to his condition, his wife said, "You have made a new man of him."

In my cases of gastroptosis with much dilatation I have practised, and I believe with good results, gastroplication of the anterior wall. Although from very high authority this operation on the stomach has been considered valueless, I am convinced that it adds to the rapidity with which, after omentopexy, the stomach regains its tone. The distention of any hollow organ for a long time, whether it be the stomach, heart, or the bladder, reacts visciously on its musculature. A hyperdistended bladder from prostatic enlargement may never regain its tone, even after the primary cause has been removed. By reducing the size of the stomach even moderately, as can be done by gastroplication, its musculature has its work facilitated and unnecessarily actually reduced in amount in proportion to the diminution of the stomach's capacity. The proper operation for lifting the stomach is omentopexy, with the details of technique above alluded to. I do not believe that the stomach ought ever to be directly fixed to the abdominal wall. By omentopexy we replace in a large measure the horizontal shelf made by the mesocolon on which the stomach ought to be supported. The shortening of the gastrohepatic omentum has never impressed me as a rational procedure, since its function as the suspensory ligament of the stomach is negligible.

In conclusion I feel justified in submitting the following theses summarizing my views on the operative treatment of certain visceral ptoses.

1. Every case of gastro-enteroptosis should be studied individually and should not be treated in a routine way, whether by medicine or operation.

2. If after the removal of a normal or nearly normal appendix the patient continues to suffer, he should not be lightly classed among the hopeless neurotics. Rather is it the duty of the surgeon to see whether he has not overlooked some visceral displacement or torsion, which is the cause of the suffering.

3. A small incision in abdominal work has some disadvantages.

4. The conclusion of the internists based on laboratory findings, as, for example, after ingestion of a test meal, cannot be made the basis of the functional capacity of the stomach under every-day conditions.

5. In many seemingly hopeless cases of gastro-enteroptosis with marked neurasthenic symptoms, operation promises relief. If this is the result of suggestion, it is none the less valuable if the relief is permanent.

6. Whereas, of course, internal treatment, abdominal supports, and postural treatment should be tried, operative interference should not be unnecessarily delayed, lest the habitus nervosus becomes too deep-seated to be eradicated.

7. No gastroptotic patient should be operated on unless some actual functional disturbance can be demonstrated. To relieve this must be the aim of the operation.

8. Given a gastroptosis in which we can demonstrate distinct functional incompetence or deviations, the existence of nervous functional phenomena does not militate against operation, but may be the chief reason for performing it.

POSTOPERATIVE GASTRIC DILATATION

By T. C. Witherspoon, M.D.
Butte, Montana

Two years ago I presented to this Association a paper entitled "Gastromesenteric Ileus following Gastro-enterostomy." The conclusions to which an observation of the case led were: Gastromesenteric ileus in the case was not due to obstruction. The stomach was paralyzed and incapable of contracting. The lack of union in the abdominal wall was caused by trophic changes in the spinal cord. The only explanation of this apparent lesion of the cord which caused paralysis of the stomach and non-union of the abdominal incision was a toxic agent most probably from the alimentary canal.

Since that time I have had the opportunity, as well as the misfortune, of making postmortem examinations of two bodies in which death followed gastro-enterostomy. In both there was a marked dilatation of stomach unassociated with a discoverable infection of the surgical territory. In both a short posterior loop operation was done and postmortem showed the gastro-intestinal anastomoses had healed and were widely open; absolutely negativing the question of mechanical interference with emptying of the stomach.

To the surgeon this subject of gastric dilatation is brimfull of interest, and one is tempted to enter very fully into a consideration of it. Time limitation will, however, hardly permit. I shall, therefore, briefly relate the two histories, and sum up the conclusions to which experience with the three cases has led me.

L. R., male, aged thirty-two years, entered the hospital June 25 last. Unmarried, fireman by occupation, father died of some stomach trouble. No history of venereal trouble, injury or past sickness. Always has been able to attend to his work, though since childhood he had symptoms of stomach disorder. During the last few years, gas, pain, and vomiting have distressed him more and more. Pain bore no definite relation to time of eating or quality of food. Vomiting usually relieved pain; the vomitus was coffee-ground in appearance at times. The periods of marked discomfort alternated with those of relative comfort. The last attack began on May 27 with the usual syndrome.

Physical Examination. Thorax negative; stomach dilated to right of median line and downward; tender to pressure. Patient vomited 300 c.c. of dark brown fluid while being examined, which contained much blood. A tube was then passed and 900 c.c. of the same material recovered. The analysis was as follows: *Chemical.* Hydrochloric acid, 25; combined, 95; lactic, none; bile, trace; blood, quantity. *Microscopic.* Old blood; undigested starch; no sarcinæ; no stomach epithelium; a few small bacilli. Feces showed blood, otherwise normal; urine, specific gravity 1017. No albumin, pus, or casts; Morgan's thread test not used. Operation: Posterior short-loop gastro-enterostomy. Death, July 10. Autopsy: Stomach largely dilated; intestine normal; gastro-intestinal anastomosis healed and well open; liver passive hyperemia; lymph glands near pylorus slightly enlarged, simple hypertrophy.

D. W. resided in a neighboring town. Male, aged thirty-nine years, sheriff by occupation. Nothing in family or personal history of any importance. Present trouble began on June 15, with epigastric pain; no nausea; pain intensified by eating; free from pain with empty stomach. Was sent to a local hospital with temperature of 104.5° and thought to have scarlet fever.

July 7 was sent to Butte for examination. Complained

of epigastric, dull, aching pain and tenderness on pressure. Temperature 99.8°, pulse 80. Morgan string test, gastric analysis; urinalysis and blood count gave the following:

The string was stained mildly with blood at a point just short of the pylorus. After a test meal, 120 c.c. recovered which gave 30 c.c. only of filtrate. No free hydrochloric acid; combined, 38; trace of blood; no lactic acid; nothing of note microscopically, save blood. Urinalysis, specific gravity, 1029, trace of albumin, occasional hyaline cast.

White blood count, 13,200; differential: 78.9 per cent. neutrophiles; 5.2 per cent. transitional; 1.3 per cent. large lymphocytes; 14.5 per cent. small lymphocytes. Feces contained no blood.

Patient discharged July 8, instructed as to diet and medical care and sent home to his family physician. On August 12 he returned, having lost 35 pounds in the month. Had suffered most of the time. At this time blood was discoverable in the stool and vomitus. Urine still showed albumin and hyaline casts. We thought it wisest to open the abdomen. Appendix removed, chronically inflamed, and gastro-enterostomy short loop performed because of the dilated stomach with pyloric ulcer and perigastric adhesions. Death August 24. Before death a marked dilatation of the stomach associated with urinary suppression for nearly three days.

One interesting fact observed during the life of this patient following operation was the constant presence of a large number of streptococcic chains in all vomited matter, and in that removed from the stomach by the tube. Hydrochloric acid was at all time absent. Postmortem findings were like those in the former, except for the active renal lesion.

It is interesting to note that in all three cases a marked dilatation of the stomach existed without obstruction. No portion of the intestinal tract was similarly dilated. There was no infection of the surgical field, and visceral union was

perfect. Unlike the cases recorded in my former paper, there was good union in the parietal wounds of the last two. Unfortunately in the patient L. R., no effort was made to isolate and identify the organisms of the stomach during the period of dilatation. In the case of D. W., streptococci in long chains were found in abundance. No bacilli of any variety. Neither of these patients suffered pain about the epigastrium as did the first patient. I am impressed with the idea that in the former the segmental trophic disturbance manifested itself in both visceral and somatic nerves, while in the latter case in the visceral nerve distribution alone.

In all three cases the paralysis of the stomach, the freedom from mechanical interference with movements of and emptying of the organ, the purely local nature of the dilatation, the lack of any demonstrated wound infection and the distinct segmental character of the trophic disturbance seen in the first patient seem to point distinctly to a central paralysis. I regret exceedingly that I did not follow the bacteriological examinations in the first two patients as I did in the last. Both postmortems indicated a toxic change in the liver and the last in the kidney as well. What the nature of the toxic process was I cannot even guess with any satisfaction.

Twice in the last two years I have had an opportunity to demonstrate the distinctly protective value of colon bacilli vaccination before operating. The two patients had had abdominal operations before, and each suffered seriously from vomiting and gastric dilatation, which necessitated lavage, and they both suffered likewise from urinary shut-off for twenty-four to forty-eight hours. Both feared a second operation, especially as the nature of the procedure was to be more serious. I thought it wise to at least immunize against the common source of bowel intoxication and therefore vaccinated against the colon bacillus until 200,000,000 caused no reaction. The result was a recovery

after operation, without nausea or meteorism in any part of the intestinal tract. While the two instances demonstrate nothing of scientific value, they nevertheless point a way and open a field for inquiry.

What the service of the streptococci found in the last case was in developing the gastric dilatation cannot even be conjectured. I am inclined to believe that the common colon bacillus is the usual efficient agent and the other organisms may be accessories.

POSTOPERATIVE GASTRIC DILATATION

By George A. Hendon, M.D.
Louisville, Kentucky

The essential cause of acute dilatation of the stomach has not been settled. Kinking of the lower duodenum across the root of the mesentery is most frequently assigned. It is doubtless that the symptomatology is the result of the absorption of toxins of a peculiar and highly specialized nature. It is also apparent, from the clinical symptoms, that the force of this toxin is spent upon the centre of circulation primarily, and secondly, as to time, upon the cerebrum. It is not clear to me whether the vasomotor centre is the one chiefly involved, or whether the muscle of the heart is acted upon through its nerve supply. The early and very remarkable mental disturbance that has been invariably met, in my experience, reminds me of typhoid intoxication.

Neither the source nor the chemistry nor the pathology of the fluid found in the stomach is as yet clearly understood. In studying the etiology, one should remember that acute gastric dilatation occurs in conjunction with diseases other than those involving operation. It has been observed in typhoid fever, puerperal eclampsia, acute septicemia, kyphosis, and pneumonia. Also, the introduction of drains into the abdomen, especially about the gall ducts, is considered to be a factor in its production. It has followed the simplest forms of abdominal surgery, such as an interval appendectomy, or anchoring a kidney, but it is thought to be more frequent after operations about the gall-bladder and ducts, and the pylorus. The condition has followed all kinds of operations, such as excision of the hip, operations

for the relief of club foot and prostatectomy; also, traumatic injuries, especially of the abdomen. Mayo Robson, writing in Keen's *Surgery*, reports 2 cases which followed, during convalescence from abdominal section, the eating of a raw apple.

The following are the causes set down to date:

Pressure of the distended stomach on the third part of the duodenum. (Box and Wallace.)

Pressure of the superior mesenteric vessels on the duodenum, which they cross transversely. (Albrecht.)

Spasm of the pylorus. (Pepper and Stengel.)

Excessive secretion in the stomach. (Fagge.)

Paralysis of the stomach wall. (Robson.)

As the majority of cases so far reported have accompanied operations involving general anesthesia, it is fair to presume that general anesthesia is, in some way, an etiological factor. So far as I am able to find out, collective studies have been made by Dr. Lewis Conner (*Amer. Jour. Med. Sciences*, March, 1907), 102 cases; Dr. Campbell Thompson (*London Lancet*, August, 1902), 44 cases; and Dr. Joseph C. Bloodgood (*Annals* of *Surgery*, November, 1907), 10 cases; making in all, 156 cases studied in group. Polak (*Trans. Amer. Gynec. Soc.*) observed 8 cases in 1000 abdominal sections, this being the only note I could find as to the relative incidence of the disease. The same author states: "It is probable that the Fowler position favors the constriction of the duodenum by allowing the small intestines to drag into the true pelvis and draw down the mesentery. The same thought had occurred to me before reading this note. John G. Clarke states he believes that, in some instances, acute dilatation is merely a terminal symptom of fatal toxemia due to renal or hepatic insufficiency. When nature attempts to eliminate the poison through the stomach, the latter becomes poisoned, exhausted, and paralyzed, thus precipitating an acute dilatation and sudden collapse." Nervousness and irritability are prodromes. The urine is invariably scanty or suppressed.

The diagnosis should be made early by the introduction of the stomach tube. Never wait for incessant vomiting. But in every case where there is tympany and nervousness, fast and feeble pulse, the tube should be introduced regardless of vomiting or other symptoms. If the stomach is found to contain a greenish, or brownish, non-feculent fluid, there is no need for further investigation; the indication is plain.

I am familiar with the fact that many cases of postoperative sepsis have been extenuated by classifying them a postoperative dilatation of the stomach, just as the same cases have often been reported as fatal cases due to the effect of ether upon the kidneys and suppression of urine, or the lighting up of a latent nephritis. It is, therefore, incumbent upon the surgeon who reports cases of gastric dilatation after operation, to discriminate carefully and establish a differential diagnosis between this condition and postoperative infection. The line of separation between the two classes of cases is sufficiently well defined to render the differential diagnosis clear and unmistakable.

The mortality in reported cases has been high—too high, and it stands as a discount against diagnostic competency. A mortality of 69 per cent., as reported in a group of 80 cases, shows that the physicians had treated terminal symptoms and had recognized only terminal symptoms. The prompt use of the tube will reveal the disease in its very incipiency.

Let me repeat: Give heed to regurgitation and be aware of its significance as a symptom, but do not wait for its appearance before acting. Restlessness, depression, violent thirst, rapid and feeble pulse, abdominal distention, scanty urine—these symptoms are as reliable guides as the vomiting itself, and many times make their appearance twenty-four hours earlier.

Treatment. *Lavage of the Stomach.* Each washing should be continued until the fluid returns without stain. If the patient has been in the Fowler position, he should be taken

down flat, no food allowed, and proctoclysis instituted. We frequently see the advice to turn the patient upon the abdomen, or place him in the knee-chest position. Such advice might be followed in a case that has not been operated upon, but after an abdominal section, I do not think the idea is practicable. We are advised to give strychnine, a drug which is incomparable in its deficiencies. Mr. Mayo Robson has employed gastrojejunostomy as a last resort, and recommends the procedure. Those of us with a little experience know what hazard there is in secondary operations, and in operations of last resort under any and all circumstances. The futility of drugs administered per orem, even when vomiting is not present, is quite obvious.

In regard to prophylaxis, the most that can be said is that as long as we are in ignorance as to the cause and essential nature of a disease, we are powerless to evolve any successful measure toward its prevention. We do know, however, that surgical risk of all kinds is minimized by short anesthesia, gentle manipulations, uncomplicated technique, and a thorough knowledge of the patient before he enters the operating room.

While I am more inclined to accept the toxic hypothesis as to cause than I am the mechanical, yet I would not do anything to favor the production of the latter. Hence, upon the appearance of symptoms of acute dilatation, if I had my patient in the Fowler position, I should lose no time in getting him flat on his back; or, if feasible, on his abdomen. There are several cases reported in the literature as being relieved by the prone posture.

Report of Cases

The first case was one operated upon for stone in the cystic duct.

Mrs. H., aged thirty-seven years. Usual history of digestive trouble and some pain. The gall-bladder was distended

with mucus. A single stone was found wedged in the cystic duct. This was removed and no other evidences of disease were recognized. The operation proceeded without notable incident from start to finish. Tube drainage was instituted, and the flow was prompt and efficient. She revived from the anesthetic satisfactorily, and had but little nausea. On the morning of the second day, or about forty-eight hours after the operation, the head nurse telephoned me that the patient was dying, and added that she did not believe she would live until I could reach her. When I saw the patient I readily shared the opinion of the nurse. She presented the complete picture of approaching dissolution. Her features were pinched, eyes sunken, surface clammy, pulse barely perceptible, extremities cold, and she was unconscious. Her abdomen was distended, and she had been spitting the familiar dark brown, grumous material, which in the past has invariably presaged disaster. I introduced a stomach tube as quickly as possible and siphoned several quarts of the brackish fluid, about the color and consistency of boarding-house coffee. The improvement in the patient's condition was at once noticeable, and steadily advanced. In the afternoon I again saw the patient and repeated the procedure, this time getting about half as much fluid as in the morning. After that the gain made was so rapid and consistent that further lavage did not appear necessary. The patient's recovery was complete and her health since has been all that could be desired.

The second case was one in which I had done a lifting operation on the uterus and removed a chronic appendix. This also was in a woman, but she was short in stature and rotund in figure. She stood the operation well, but showed her distress first by restlessness and cloudy mentality, gradually lowering temperature, and increased rapidity of pulse. The distention was not marked at first, and there was but little vomiting. The distention probably did not attract attention early because of the natural contour of

the abdomen. The first alarming symptoms came on the third night after the operation, and consisted of lowered temperature, fast and feeble pulse, and talkative delirium.

The stomach tube was introduced and the stomach contents evacuated. The material withdrawn was identical in appearance with that described in the previous case. The relief, however, was not nearly so prompt, and her condition, as graded by the washings and general symptoms, demanded a continuation of the lavage treatment over a period of five or six days, with as many as two treatments per day. She made, in the end, a good recovery, and has remained well up to the present time.

R. L. N., male, aged twenty-one years; plumber. Had the operation of external urethrotomy performed for stricture in the membranous urethra on the afternoon of November 9, 1911, which fell on Thursday. On the following afternoon the temperature was 101.6°. On Saturday, 7 A.M., it was 102.6°. Marked abdominal distention, especially in the upper abdomen. He showed signs of severe prostration and great distress. There was nausea and futile attempts at emesis. These conditions persisted with growing intensity. Saturday morning he spat a few mouthfuls of characteristic chopped-spinach material. I then introduced the stomach tube, and siphoned four pints of fluid, and an estimated pint was vomited beside the tube. The following morning (Sunday) his temperature was 101°, and pulse, which had ranged from 100 to 112, was now 110. Improvement of all the symptoms was notable. Lavage again performed and three pints of semifluid material similar to that removed the evening before was siphoned. The following morning (Monday) lavage was again performed; about a pint of the material removed. No more symptoms now remained referable to the abdomen. The bowels had moved without difficulty the second day following the operation. The urine could not be estimated as it drained through the perineal opening, a considerable amount going

beside the drainage tube. The discharges from the wound were examined and proved a pure colon bacillus infection. The patient was given stock vaccine of colon bacillus, and made a prompt recovery to date. This case is significant in this connection, because it illustrates acute gastric dilatation in a condition independent of abdominal lesions. It therefore gives weight to the hypothesis that the cause of gastric paresis and morbid secretion after operation is essentially a toxin.

A cholecystectomy was done upon a man, aged forty-two years. A single stone, without facets, was removed; tubular drainage instituted, with a cigarette drain alongside. The bile flowed freely through the tube. On the second day after the operation the patient showed the unmistakable signs of distress, but no vomiting had occurred. There was considerable distention and the pulse was very rapid (140); weak gastric lavage was at once resorted to, and a large quantity of the fluid siphoned away. This was repeated from time to time, as was deemed necessary, but it appeared that the stomach would refill almost as fast as we withdrew the fluid. Despite all our efforts things went from bad to worse, and the patient succumbed in about forty hours after the onset of alarming symptoms. One very important factor in the case was that as soon as the gastric dilatation began to manifest itself, almost complete suppression of urine supervened, and we were never able to arouse the kidneys to action.

In one of my cases, occurring several years ago, the complication of gastric dilatation came on about three days following a posterior gastro-enterostomy. The case is not reported in detail because I kept no record of the clinical history. Lavage was practised and patient recovered.

In the cases here reported and the studies I have made upon this subject, either urinary suppression or insufficiency is a constant accompaniment. In the case reported above, in which cholecystectomy was done, there was no difficulty

in getting a movement of the bowels or in expelling gas per rectum.

The hypothesis of the pathology of acute gastric dilatation is that the stomach acts like the septic tank in the private system of house drainage. On account of intestinal paresis below a given point in the intestinal wall, peristalsis is arrested or reversed. The stomach being an organ capable of answering increasing demands made upon its capacity, furnishes storage facilities for the contents of overcharged intestines. The material is conveyed thither either by means of reverse peristalsis or upon the principle of siphonage. The material itself can be accounted for as a morbid secretion of all the glands of the gastro-intestinal system, including the liver. This morbid secretion we might recognize as a process of elimination undertaken by nature to meet the exigencies of a specialized form of toxemia. Admitting the truth of these premises, the problem is then reduced to the concrete form of needing only the definition of the kind of organism producing the morbid changes and the conditions essential to their growth for its solution as far as cause and pathology extends.

Conclusions: 1. The essentials in the pathology are not known.

2. The most plausible theories are: (*a*) Kinking of the lower duodenum under the mesentery, causing a mechanical obstruction, and, as a result, hypersecretion and the paralysis of overdistention; (*b*) some unfamiliar toxin causes paralysis of the muscular walls and resultant hypersecretion and retention. This causes the organ to be top-heavy and sag down, thus producing the duodenal kink.

3. There is a deadly toxin generated, either as the cause or the result of the dilatation, which has a peculiar and powerful depressing effect upon the vital organs.

4. That in treatment we should not wait for vomiting to appear before becoming active.

5. The stomach tube is the only reliable means for relief.

6. That obscure and alarming symptoms affecting the abdomen after surgical operations should be investigated through the stomach tube.

DISCUSSION OF THE PAPERS OF DRS. COFFEY,[1] RANSOHOFF, WITHERSPOON, AND HENDON.

Dr. Robert T. Morris, of New York City.—Concerning visceroptosis, I was one of the first to take up this work. My patients, at last accounts, were all alive, and so am I, and that is the most important feature to note. The reason why I did not publish reports of these cases was because just as I was about to publish reports of good results the patients came back with an entirely new lot of symptoms. These visceroptoses were in a neurotic group of patients, some of whom went to Christian Scientists and got well again; so I decided that my operation was simply a startling placebo.

After hearing the reports of Dr. Coffey and Dr. Ransohoff, I must go back again and decide that I did not use proper judgment in the selection of cases. That I am perfectly willing to admit. Now, with the experience of Dr. Coffey and Dr. Ransohoff we may make a wise selection of our cases in which operation will be very effective and permanent, not eliminating, however, the neurotic element, that fundamental factor which is present in such a large proportion of cases. As Dr. Coffey has pointed out, it is a most dangerous field to open up for the general operator. It must be done by men who use care and discretion, such as are evidently employed by Dr. Coffey and Dr. Ransohoff, and with our modern methods of diagnosis.

In regard to small incisions, I believe very much harm may result if this work is not done by men who begin with long incisions. They should take their first lesson in surgery by going to the fish market and seeing how they dress mackerel. We should make a mackerel incision to begin with. After that, if we can give a patient the benefit of a short incision in a selected group of cases we should do it, but we should not leave undone those things which may be left undone through a

[1] Owing to Dr. Coffey being in Europe for some months, he was unable to complete his paper on "The Principles Underlying the Surgical Treatment of Gastro-intestinal Stasis" in time for its appearance in the Transactions, and it is therefore omitted.

small incision unwisely used. When we have ptosis of a single viscus, like a kidney, that is evidently causing symptoms, causing torsion of its vessels or of its innervation, we should operate. If we cannot keep it in Gerota's pouch, we should operate and fix it. If we have ptosis of the colon, or ptosis of any one viscus, we may fix it, if we are very sure that is the thing to do, after the patient has had the benefit of first-rate diagnosis and medical treatment.

In regard to gastroplication, I do not believe in it, and I am sorry I described that in Sajous' *Cyclopedia.* I ought to have said in a footnote, "After learning how to do it, don't do it."

Concerning acute dilatation, in acute gastric dilatation there are many kinds of disturbance, each one furnishing a different ray of light, but these rays of light have been all parallel. Let us get them together through a big lens and focus them, and if we do that we can point by bright light to the sympathetic control of the pylorus and duodenum. If you cut the pneumogastric experimentally in dogs, what happens? Gastric dilatation. If you are not cutting the pneumogastric in these cases, what else can produce the symptom? Overstimulate your sympathetic controls to the pylorus and duodenum, and you can get the same result, dilatation. Control the toxins excreted in this region. Stop toxic overstimulation. Do not your rays of light focus to that one point? Of course they do. That is the way I look at it, at any rate. If we are having overstimulation of sympathetic control of this area, that will account for the excessive secretion also. You may have further phenomena secondarily, from angulation of the pylorus, but be sure to keep the mind right on that one fact of overstimulation of sympathetic control in this region. The excessive gastric secretion is only part of the same story. You have the secretion of hormones which send messages to the secreting glands, and the secreting glands getting wrong messages fill the stomach with a crazy lot of products, and the matter is easily explained on that hypothesis. The colon bacillus often furnishes a toxic element for causing overstimulation to the sympathetic control of this primitive region. It is not always a toxic overstimulation. I reported one case in which I commented upon a small burn of the epigastric region, in which case we had an acute gastric dilatation and death of the patient. At first I ascribed the death in that case to absorption of the toxalbumin which follows a burn. The toxalbumin is similar to rattlesnake poison chemically, but does not produce symp-

toms quite like rattlesnake poisoning. In such a case the overstimulation might really have proceeded from the superficial area described by Head as belonging to disturbances of the stomach. Head describes irritations proceeding from viscera, transmitted to segments of the spinal cord, and then referred to superficial areas corresponding to somatic distribution. The burn occurred in the head zone for the stomach. In that case we might have had overstimulation from the superficial area applied to that particular segment of the cord and a reflex sent to the stomach. We may thus have had an overstimulation there, not toxic in character, but due to a reflex from the superficial burn stimulation in the Head zone for the stomach, instead of the toxalbumin influence, to which I first ascribed the dilatation.

Dr. Joseph C. Bloodgood, of Baltimore.—I think it requires some courage to discuss this subject of ptosis of the stomach and colon. I read a paper before the Medical Society of Virginia at Richmond some weeks ago, and presented specimens, and in my paper here today I avoided discussing this question because of these papers.

There are some surgeons throughout the world who have certain views in regard to the treatment of ptoses, but it is a great question whether the general public and general profession are ready for a statement of their views.

The question of the symptoms before operation and the symptoms after operation, it seems to me, is the one of importance upon which we must base our conclusions. I think both Dr. Coffey and Dr. Ransohoff clearly demonstrated what seems to be the prevailing view, as I gather it, from the various contributions from different countries with regard to the treatment, and the indications for treatment are not anatomical. They are clinical. These patients suffer from certain symptoms, and the question arises, Can we relieve them? When Mr. Lane spoke before the American Surgical Association some four years ago he told a great deal of truth, but before the wrong audience. There were a few in the audience who agreed with him, and it is a question how much good a discussion with regard to theories will do, but I am inclined to think from actual experience that the surgeons who have attempted to relieve these patients of their conditions are interested in this subject. There is no doubt that preventive medicine will prevent a great deal of surgery. I have often felt that if surgeons had read this article

they would feel that most of our surgery is unnecessary. Some operations should not be done at all, and most of them should be done at an earlier period, but nevertheless we as surgeons are called upon to treat conditions which have not been prevented, and among those that are crying out today to the surgeon are the conditions and symptoms associated with ptoses. I did not begin this work until January a year ago. I had had a peculiar experience with resection of the stomach and colon for cancer, and we have demonstrated that the mortality of that operation is relatively low, and the average individual is comfortable after one-half of the stomach or one-half of the colon has been removed, so that there is no contraindication against removing a large portion of the stomach or colon by a surgeon who has had experience in doing it for cancer. The mortality should be very small, and the first thing you must say is, You must not attack these cases of ptoses without having a definite idea in view, and while there may be some mortality, as a rule these conditions are not necessarily fatal. It would be well to begin with cases in which the symptoms are very marked, so that in January, 1911, the first time I operated I began with the worst type of case. I began this work on a man who was vomiting, with a residuum of 400 c.c., and obstinate constipation. He also had mental depression. I did not think I could relieve him of his nervous depression, his mental depression, but I could relieve him of the stasis in the stomach and colon. I resected the stomach, and performed a Kocher operation for ptosis of the stomach. It is hardly necessary for me to go into details. The stomach hangs there, the pylorus empties itself, and like a string, if you shorten the string you can make a straight line. You can dissect enough of the stomach, when you suture the duodenum to the greater curvature of the stomach, to get a straight line. There is no difficulty in resecting such a stomach. That man today is well so far as his stomach is concerned. He has no residuum. He eats what he likes. So far as the large intestine is concerned, he is much better, although constipation is not absolutely relieved. There is no improvement in his mental symptoms. Since then I have had 3 cases in which, on account of the marked residuum in the stomach, and on account even at operation of no duodenal distention, but a kink at the pylorus, I have resected the stomach and colon in those three instances. This man is perfectly relieved of his abdominal symptoms, but not at all relieved

of his mental symptoms. The second case was one of tuberculosis, turned over to me by a colleague connected with the neurological department, who had him under his care. He said it was impossible for him to do anything for the patient, that anything the patient took she vomited. He could not get the bowels to move. She had a residuum of from 200 to 500 c.c. We resected the colon and stomach; she stood the operation well, and within a week was able to have passages. She has no more abdominal symptoms, but the operation has not relieved her of the tuberculosis.

A third case had the same clinical symptoms, so far as the stomach and colon are concerned, and she is convalescing from the operation. She is in good condition.

There was a second group in which the gastric symptoms were the same as the first, particularly as regards the residuum and constipation; but I found that operation instead of a pyloric kink, a hugely dilated duodenum, and I did not feel that resection of the stomach with a Kocher anastomosis would relieve the dilatation of the duodenum. In this case there was a giant cecum in the pelvis, and as I lifted it out of the pelvis and put it back I could demonstrate the pull on the mesentery of the small intestine. It seemed to me that if I could relieve that, I would relieve the duodenal dilatation. So I resected the right half of the colon, but did nothing to the stomach. The stomach in this patient was about the same as it was in the other three in which I resected the stomach. The duodenum was very large; you could see it shining through the mesentery of the transverse colon.

Finally, I wish to say that the best results have been in this group of duodenal dilatation. Their stomach symptoms have been absolutely relieved, and I may say that we can relieve these patients of their stomach conditions, but resection of the right half of the colon will not always relieve them of their constipation. They may have a temporary diarrhea for a few weeks, but in a certain number of cases constipation will not return, so that the problem of what to do from the standpoint of resection is by no means settled.

Dr. G. E. Gavin, of Mobile.—There exists a condition of coloptosis which can be divided into a nervous condition or into a mechanical condition. The nervous condition, if neglected too long, will finally become mechanical. That is

according to one of nature's laws that we find evidences of in other parts of the body as well as in the intestinal tract.

I have had some experience with this operation for intestinal stasis, and have found that the Lane operation of ileosigmoidostomy gives fairly good results in the long run, but primarily does not give much promise and gives one quite a good deal of trouble while waiting for the results.

I am free to say that since hearing Dr. Coffey's paper and that of Dr. Ransohoff, I believe from this time on I shall certainly adopt that method.

I have had 15 cases of ileosigmoidostomies during a period of four years. All are living except one. One patient I lost on account of leaving a space between the meso-ileum and the meso-sigmoid, which resulted in hernia in behind the anastomosis. Until I saw Mr. Lane work last year I always attached the meso-ileum down to the meso-sigmoid or rectum. I left it unattached in this case and I had a hernia with obstruction, with a fatal result. Several of the patients on whom I operated three or four years ago are now doing very nicely indeed; but all of them had a back action into the colon, with more or less accumulation of masses that had to be gotten rid of by sweet oil enemas, etc., but in the last year those on whom I operated three years ago are reporting to me a satisfactory condition. I believe the atrophy that has taken place has had something to do with the back action subsiding. Most of them have been greatly relieved of the toxic symptoms. I have not been converted to that operation, because I consider that the disturbance we make there is something very serious. The operation itself is not so grave. We all know that intestinal toxemia plays a great role in a great many troubles from which we suffer. Goldthwaite has proved that arthritis is due in a great many instances to intestinal toxemia, and a great many other troubles are due directly to this condition. I will say, I removed the entire colon in one case a little over four years ago, and four inches of the ileum down to the rectosigmoidal junction. That case is doing nicely; the patient has gained twenty pounds in weight, and is able to do work now, whereas before the operation he was not doing anything, or had not done anything for several years before.

In another case I resected the ascending colon and part of the transverse, and that patient is doing nicely. These are very grave operations, and if the conditions can be corrected

without resorting to these serious operations, I think it should be done. I think we should consider seriously the resection of the entire colon, as it is not an easy operation, and the patient is fortunate if he survives it. These are my conclusions from what work I have done along this line.

This morning Dr. Mayo spoke of a lack of the colon rotating on the right side, causing some trouble in early development. I had a case which, I am quite sure, had something to do with the development of duodenal ulcer, a part of the duodenum being involved and a good deal of the neck of the stomach. So large was the growth that I thought it was malignant, resected it, and after resection of a third of the stomach and a little of the duodenum, I went down from the duodenum to make the anastomosis between the jejunum and stomach and found no colon at all. I then made a free incision and found the colon coming up on the left side and going down on the left side, with a very much dilated cecum and a long meso.

Dr. Albert Vander Veer, of Albany, New York.—In one of the papers this morning reference was made to the old family physician. We have had in these four papers, it seems to me, some of the points that the younger men are about to face. I lived through that period when the general practitioner would not have an operation done upon the gall-bladder until the patient was yellow and had jaundice. I have passed through that period in my life when the family doctor did not care to have an operation done upon the appendix until he could feel a tumor, and I might refer to other illustrations of this kind. But that class of practitioners, the men whom I met in my early life, are not with you at the present time. You are coming now to a class of general practitioners who are going to investigate this subject, and who are investigating this subject of gastroptosis and of gastric retardation, and all that, the visceroptosis, and so on, which we know occur. We know what they are going to do at present; they are going to investigate these cases thoroughly from a medical standpoint. Investigation of the contents of the intestinal tract is attracting their attention in a wholesome manner. Lesions of the stomach are receiving the earnest attention of the general practitioner. There are cases which they recognize do not get well; that cases of constipation are not benefited by medical treatment carried out so intelligently as it is at the present time. All these things are coming about.

I have had some personal experience myself, and I must say the conclusions reached here by some of the authors this afternoon impressed me earnestly that they are going to do great good. If you must continue to discuss this subject, you must continue to investigate it, and you must realize that these cases are to be relieved. They are to be relieved on the basis of correct diagnosis and the surgical experience that comes to you.

Here is a man like Dr. Bloodgood who tells us what he has been doing the last year, and he has reached certain conclusions after careful observation extending over a number of years I have no doubt. Dr. Coffey gives us the results of his work. I presume we can all look back and remember cases we operated upon five years ago for some gangrenous condition of the intestine, removing a great portion of the intestine, and relieving these patients of their symptoms, leading to recovery. Therefore, I wish to say this: Get at a correct surgical solution of the case as soon as you possibly can. These patients will come to you for relief, and I trust that within the next two decades or next decade that abdominal surgery in reference to the large intestine and intestinal tract may be cleared up as nicely as I have seen within my time, the clearing up of the right side of the abdomen, considering the great progress that has been made and is being made in a great many respects with regard to the peritoneal cavity.

Dr. J. Garland Sherrill, of Louisville.—This subject is interesting to all of us, but I must confess that I have been heretofore in the class of doubters as to the good or benefit to be obtained by surgical work of this kind. I am glad to have heard these papers today, and especially to hear what Dr. Coffey had to say on the subject. We know that there are certain cases of stasis which demand relief, and they may not be due to the position of the intestine or the stomach. When we began the study of medicine we all remember that the textbooks placed each organ in a certain fixed position, and we learned that that was the position for that or this organ. When we made observations on the human body, and studied anatomy in the living, we soon found there was no fixed place for the abdominal viscera; that they may be in any part of the abdominal cavity, and I think studies along this line will prove of great benefit because many of these cases that are operated upon in our enthusiasm will turn out not to be cases of displaced viscera,

and that we were operating on cases unnecessarily. We will also find that there are some cases in which the viscera are displaced, accompanied by stasis, and these need our attention. This point has been brought out very forcibly by Dr. Coffey.

The results of the work along this line seem to me largely in keeping with what Dr. Morris has had to say; that soon after an operation is made we feel we have accomplished much good, or great benefit has been done to the patient. A little farther along we find that the condition is just as bad or even worse than it was at first; nevertheless it is a line of work or of surgery that is necessary, and it is well for us to take up the subject and discuss it very frankly and freely.

Dr. Coffey (closing the discussion on his part).—I am very glad indeed to see the attitude taken by the members of the Association in regard to this subject. I was one of the pioneers, and my work has extended over a period of ten years. I have operated on 30 cases. In my paper I have given the symptoms in detail as well as the results, and all of this work will be published in my paper in *Surgery, Gynecology, and Obstetrics,* including the *x*-ray pictures which we have been able to get both before and after operation. Of the 30 cases operated upon, 21 have been absolutely cured. Of those not cured, 2 were cases of gastric crises. It is very unpleasant to admit that I have operated on such cases. Another case was one of tuberculosis of the cecum, with the stomach being down incidentally. Three of the cases were operated on for Glenard's disease for the purpose of holding the organs in position, but these patients have not been cured.

As to the method of doing the operation, we cannot explain it to you without pictures, and you will not be able to get a clear idea unless you look at the pictures. If you do this hammock operation on a case in which there is no obliteration of the omental bursa, you will not relieve the intestinal trouble. That is something I have overlooked. I can recall 1 case in which the stomach was down low, and the colon was not lifted up because the omental bursa was not obliterated, and the colon had no support. We have opened the abdomen a good many times and found we could see the colon low down and there was practically no omentum.

As to the original hammock operation, which I described in 1902, and which was copied by Moynihan in his book, the operation has been done a great many times by Clark. But that

was not sufficient at the time. While the patients got well, as Clark proved by one of his cases, it was found that the colon sagged down. Clark has modified the operation, but I do not think he has improved it by so doing. He only uses three or four sutures and passes them clear through the abdominal wall.

Another very important feature I would call your attention to is the fact that in a number of cases in which the stomach and liver had been down, there was a narrow chest, which may be either congenital or acquired, due to the absence of the viscera in that portion. It is essential to get the stomach up, as shown in the last case, to expand the upper abdomen by the method which we have described. You take the aponeurosis of the external oblique on the front side, slit it down, and have it come down in exactly the centre, turn it in, and you expand the abdomen from two to four inches. All organs are up in there and remain in that position. In cases in which there has been an enormous distention below, by splitting the aponeurosis of the external oblique and overlapping, you can change the shape of the patient's abdomen. I think the pictures which we have, going back as far as eight and a half years, are sufficient to show that to my mind it is unnecessary to resect as much as Dr. Bloodgood does. I have had the same class of cases to deal with, patients who presented the same symptoms that his cases have, and yet I have cured them without resection at all.

As to the Lane operation, it is very rarely indicated because you can hold up the viscera without doing it. Even a Lane kink is held up without any anastomsois of that kind. You can do it by suturing the peritoneum. You can hold up the colon by suturing the transverse colon to the side of the abdominal wall. I have done that, and the patients are perfectly well. This is particularly true of ptosis of the cecum. You can hold up the parts after a Lane's kink in which the intestine is drawn down to the side, dissecting it up, and pressing the peritoneal layer above the mesentery, making it absolutely secure, and getting a perfect result. Then you turn the patient on the left side.

Some years ago the observation was made that distention of the colon was due to a kinking of the ligament of Treitz. That does occur once in a while. I cured one case by suturing the jejunum, as it went off, to the lower portion of the transverse mesocolon. There are two cases which we have not cured for some reason. We did a hammock operation, we did a gastro-

enterostomy, but we did not cure the man. The probability is that the man has a Lane kink down at the cecal end. There is another one we have not cured. These are the only two we have failed to cure, who presented symptoms of gastro-intestinal stasis. Others might have been cured by the Lane operation. There are one or two more points I want to bring out and to emphasize, and one is that Glenard's disease is exactly opposite from the mid-line ptosis which is probably due in most cases to chronic habitual constipation which loads the colon and drags down the mid-line support, and kinks the intestine at two fixed points, the second portion of the duodenum and the splenic flexure on the same side.

Surgery in Glenard's disease is rarely indicated, and when it is, unless you do a complete job, you will not get good results. If you fasten kidneys and do nothing else, or if you fix one or two organs, and do nothing else, you will not get satisfactory results. You must expand the upper abdomen and the lower abdomen if you would do good in cases of Glenard's disease. I do not know that I will ever do another such operation, notwithstanding the results have been good so far as holding the organ is concerned.

I presented my first paper on this subject ten years ago, the first work having been done prior to that time. After presenting that paper my friends began to get the impression generally that I was a little off mentally, and my best friends, whose opinion I value most highly, have told me very earnestly to let this business go, to let it alone, and I was fully determined never to touch it again until I had a case or cases, with the *x*-ray pictures, showing the results extending over several years, and this I am able to do, and you will see these results when you read my report of the work.

Dr. Ransohoff (closing).—With regard to the subject of gastroplication, I demonstrated some of the *x*-ray plates exhibited before the American Orthopedic Association two years ago. They were taken immediately after the operation and one could see where the plication was made. It facilitates, without one particle of question, the ability of the stomach to regain its tone. We know that when the bladder has been enormously distended by prostatic hypertrophy, we can remove the urine with catheter, or remove the prostate, and you know how long it takes for the bladder to regain its tone. It takes months to tone up a hyperextended muscle to its functional

capacity. By gastroplication we can accomplish things which otherwise it might take a considerable time to do.

With regard to the Beyea operation of using the suspensory ligaments of the liver or the gastrohepatic omentum, it is ridiculous. The two layers which unite the stomach to the liver are not as thick as toilet apper, and the doubling of that omentum can do no good.

I have done the operation devised by Dr. Coffey with very excellent results. I do it in a little different way, in that I do not sew the omentum directly to the peritoneum, or peritoneum to peritoneum, but split the parietal peritoneum, and in this way sew the omentum to the fascia directly. The man who has done more operations for gastropexy than any other is Rovsing, and he has had prabably as good results as anyone, and he does not do omentopexy at all. His operations are altogether those in which he takes the stomach up, uses three large silk sutures, and sutures it to the abdominal wall, and produces adhesion between the stomach and abdominal wall, which most of us here would condemn as a bad thing, and yet Rovsing, who has done 75 such operations up to 1906, and reported a large number at the International Congress at Brussels two years ago, has had better results than anyone else. I mention this to show the importance of fixing the stomach and colon, and if you fix the stomach and colon properly you will get excellent results.

With regard to strengthening the abdominal wall, that is something that is usually overlooked. Whether it is done the way Dr. Coffey has suggested by turning in the recti, or done by removing part of the abdominal wall in these multiparæ with enormous flabbiness of the abdominal wall, it does not matter, so that, after we have fixed the viscera high up where they belong, we can keep them in place by sewing up the abdominal wall by surgical procedure.

My friend Dr. Bloodgood is unfortunate in his results as to the improved mental condition of his patients. I can only say that men feel depressed because they have lost so much of their colon. This is a possibility, and I throw the hint out. The influence of chronic constipation on the mental condition of the patient cannot be questioned when I recall to your mind an incident that occurred one hundred and fifty years ago. When a famous French philosopher was exiled on one of the Channel Islands he met an Englishman, and both of them

suddenly became exceedingly pessimistic, and in the evening, after dinner, as they could not digest their meal, they concluded they would commit suicide that night. The following morning, one came down and was walking around the garden of the hotel, and was surprised to see the other one. One said to the other, "How does it happen that you are here?" He replied, "Oh, life presents an entirely different aspect to me this morning; I have had a good movement of the bowels;" and the other one said in the language which we now use, "Me too."

IN MEMORIAM

HERBERT N. NASH, M.D.
1831–1911.

On April 26, 1911, death claimed Dr. Herbert N. Nash, after a surgical operation on the gall-bladder performed the day before. He was one of the Founders of the Southern Surgical and Gynecological Association. While his advancing years prevented him from attending the meetings of the Association, his name was always an honor to its roster and his memory is a benefaction to his survivors.

He was born in Norfolk, Va., May 29, 1831, and practised medicine for more than half a century. From youth to age he labored with the fear of God and love of his fellowman as guiding stars. He was the typical Southern gentleman and the embodiment of the highest ideals in his profession: staunch patriot, upright citizen, and steadfast friend.

The Nash family was founded in Virginia by Thomas Nash, and his wife, Annie, who with their servants settled in Norfolk county in 1665. They were adherents to the Church of England, and Thomas Nash received land grants in the Virginia colony. Thomas Nash the sixth was the father of Dr. Nash.

Dr. Herbert N. Nash in 1851 entered the University of Virginia and graduated with the degree of doctor of medicine in June 1852. He received clinical instruction in New York City in both medicine and surgery during the twelve months following the completion of his university course.

Dr. Nash began practising in Norfolk in 1853 and was the sole survivor of the physicians who encountered the yellow fever epidemic of 1855. His general practice was interrupted by the war between the States, and in April, 1861, he was appointed assistant surgeon of the State forces of Virginia and attached to the post at Craney Island until May, 1862. After the evacuation of Norfolk in May, 1862, he was with the command at Seven Pines, and subsequently with the Confederate army in the battle around Richmond ending at Malvern Hill. He was also with the troops on the Rappahannock in pursuit of Pope, and was detailed to care for the wounded in the different skirmishes. After the injured were sent to the general hospital he rejoined Lee's army as it recrossed the Potomac after the repulse of McClellan at Sharpsburg. Dr. Nash was promoted to the rank of surgeon and served with Mahone's brigade at Fredericksburg, Chancellorsville and Gettysburg. He was then ordered to the artillery division of A. P. Hill's corps and was with it at Mine Run, the Wilderness, Spottsylvania Court House, Hanover Junction, Cold Harbor, and in the siege of Petersburg, where he was placed in charge of the medical department of the artillery of the third corps as its chief surgeon.

Dr. Nash was disabled and captured in a cavalry charge upon the Confederate Reserve Artillery on the evening of April 8, 1865, the evening before the surrender of the Army of Northern Virginia.

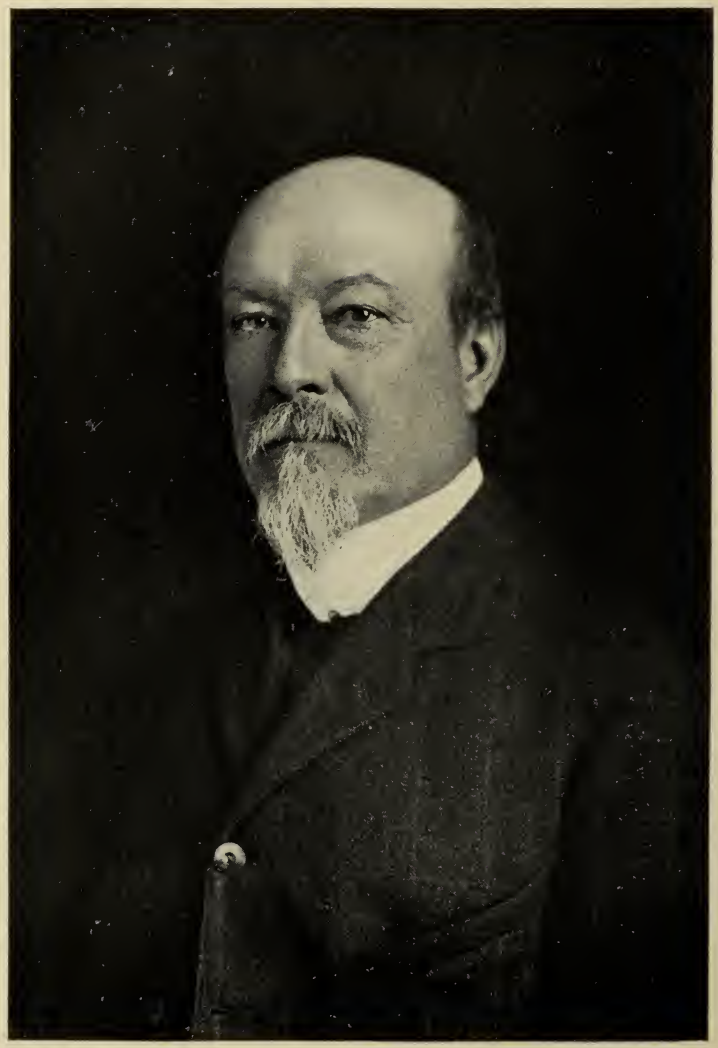
Dr. Nash returned to Norfolk in 1865, and again entered civil professional life and soon regained a good practice. The pecuniary losses incident to the war were repaired by hard work and hard study. The surgical training Dr. Nash received during the war induced him to utilize it in his rapidly growing practice in Norfolk. He began to give attention to plastic surgery and gynecology and was the pioneer of such work in the city, and some of his work was done after he had passed his three score years and ten.

Dr. Nash was a member of the Norfolk Medical Society

from its organization and served several times as its president. He became a member of the Virginia State Medical Society, was formerly its president, and at the time of his death was an Honorary Fellow.

He was a member and vice-president of the Medical Examining Board of Virginia, a member of the American Medical Association, the American Public Health Association, and an ex-president of the Norfolk (Virginia) Board of Health. He was also president of the Board of Quarantine Commissioners of the District of the Elizabeth River and an ex-quaratine medical officer of the district. He was a visiting physician and surgeon to St. Vincent's Hospital, the Norfolk Protestant Hospital. He was never a voluminous writer and his contributions to literature have principally been upon medical subjects and to medical societies.

Dr. Nash was the guest of the faculty of the University of Virginia June 16, 1902, the fiftieth anniversary of his graduation from that institution.



MANNING SIMONS, M.D.

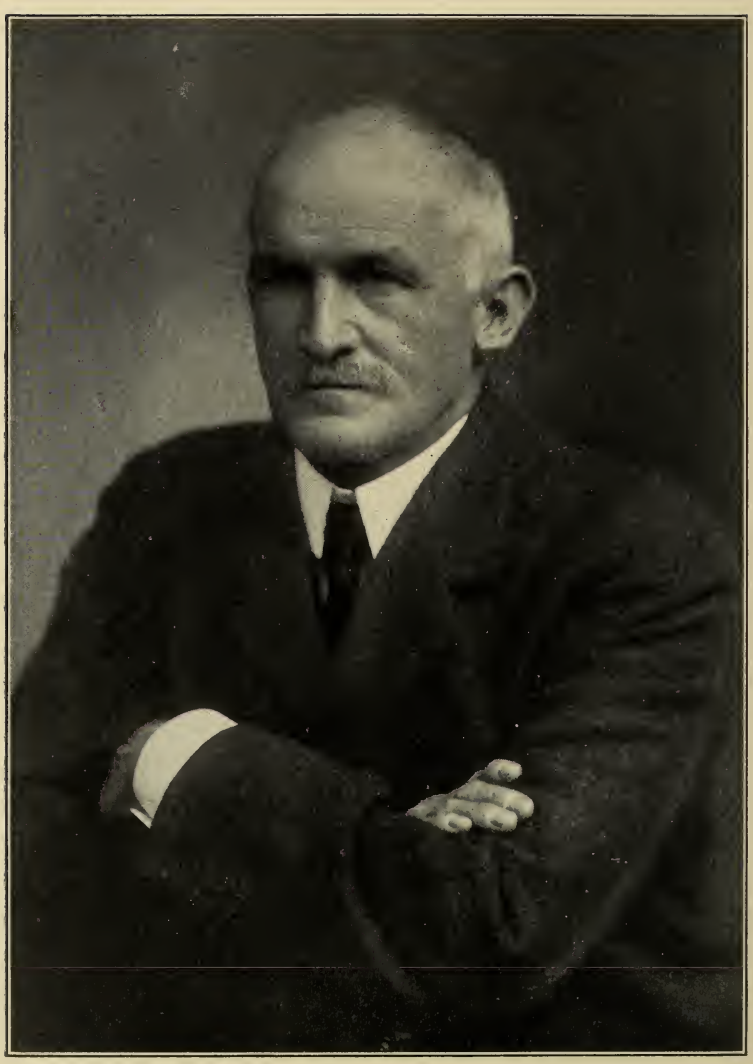
MANNING SIMONS, M.D.
1846–1911

Dr. Manning Simons, the nestor of the profession of South Carolina, died suddenly at the age of sixty-five years at his home in Charleston, on April 18, 1911. He joined the Southern Surgical and Gynecological Association in 1893; served as vice-president in 1895-1900 and in 1901 was elected President. He was a typical example of the chivalrous cavalier and his courtly presence was a well remembered incident of his almost unvarying attendance. He was a most active and untiring man and died in full possession of all his faculties, which has been the marvel of his colleagues and friends, while his ability and skill as a surgeon continued up to the very time that his sudden and short last illness compelled him to forego the duties which he had carried through so many years. He made a number of important contributions to this and other associations.

Securing a good classical education, which was interrupted by the breaking out of the civil war, Dr. Simons entered the service of the Confederacy, and served as a courier on the staff of General Hardee. After the war he matriculated at the Medical College of South Carolina, where he graduated with honors in 1868. He later became surgeon of the Roper Hospital and of the St. Francis Xavier Infirmary, continuing his connection with the latter institution to the time of his death. For more than forty years he was connected with the medical college. Early in his career he divided the work of surgery with the late Dr. Robert A. Kinloch. At the time of his death he held the chair of abdominal surgery and gynecology.

Dr. Simons was an ex-president of the South Carolina Medical Association, which was in session in Charleston at his death; the convention adjourning for five minutes from its labor in respect to his memory and adopting suitable resolutions. He was also an ex-president of the Medical Society of South Carolina and of the Tri-State Medical Association, comprising Virginia, North and South Carolina. He was an honorary member of the Chatham Medical Society of Georgia; member of the American Association of Obstetricians and Gynecologists, International Association of Railroad Surgeons, Association of Southern Railway Surgeons, American Medical Association and of the Dorchester County Medical Association. A member of the South Carolina Society of the Sons of the Revolution, Camp Sumter, United Confederate Veterans and numerous other organizations. Dr. Simons had a general and deep interest in everything pertaining to the welfare of his city and State.

Dr. Simons is survived by a widow and one son, two brothers, Hon. James Simons and H. Read Simons, and a sister, Miss Rheta Simons.



JOSEPH PRICE, M.D.

JOSEPH PRICE, M.D.

By Lewis S. McMurtry, M.D.
Louisville, Kentucky

Dr. Joseph Price, of Philadelphia, was born in Rockingham County, Virginia, January 1, 1853, and died in Philadelphia, June 6, 1911. He received his early education at Fort Edward, N. Y., and later attended Union College. He pursued his medical studies at the University of Pennsylvania, and received the degree of M.D. from that institution in 1877. Conjointly with his brother, the late Dr. Mordecai Price, he began the practice of his profession in Philadelphia, and worked there continuously until his labors were ended by death. In 1877 he was elected physician to the old Philadelphia Dispensary and assumed charge of the Obstetrical and Gynecological Department of that institution. Under his management this became one of the largest clinics in America. It was here that he began his work in abdominal and pelvic surgery, which soon placed him in the forefront of American surgeons. In the early period of modern aseptic surgery he obtained results so brilliant that these results were deemed almost incredible by the great body of the profession.

To justly estimate the lifework of Joseph Price and measure his influence upon the development of modern pelvic and abdominal surgery, it is necessary to consider the conditions existing back in the early 80's when he entered the surgical arena.

At that time the principles of Lister, as evolved from the researches of Pasteur, were accepted unreservedly by only a few, while in a half-hearted way others pretended to apply those principles in practice. The epoch-making work of

Lawson Tait, while laying the foundation of modern pelvic and abdominal surgery, and replacing antisepsis with asepsis, made indescribable confusion in the surgical mind by an apparent rejection of the essential principles of Lister.

Progress at that time was materially obstructed by an unnecessary conflict between antisepsis and asepsis, when, in fact, the principles enunciated by Lister as to the relation of microörganisms to infection were the basis of every successful method of wound treatment.

During these years the older surgeons, who occupied positions of authority, as teachers and hospital surgeons, either rejected *in toto* the new surgery, or accepted it as an experiment only. The great body of the profession, always disposed to follow established authority, was ready to discredit the claim of the innovation, and for the most part refused to accept the results of the new surgery. Not only was opposition directed against the new methods of operating, but the new pathology, especially as to infections of the Fallopian tubes, ovaries, and peritoneum, and ectopic gestation, appendicitis, etc., was denied acceptance and reported cases were discredited. In a word, those established in authority resisted change, and the body of the profession was disposed to adhere to conservative methods in preference to what seemed most radical. A revolution was in progress, and, as in all periods of medical history, it was opposed by the powers in control, while those advocating the new order were maligned and abused. It was so in the days of Harvey and Jenner. When as late as in 1870 Pasteur made a visit to von Liebig, in Vienna, with the hope of demonstrating to him the marvellous results of his labors, von Liebig, while receiving him courteously, emphatically refused to even discuss the subject with him. So it has always been, and so doubtless it will always be.

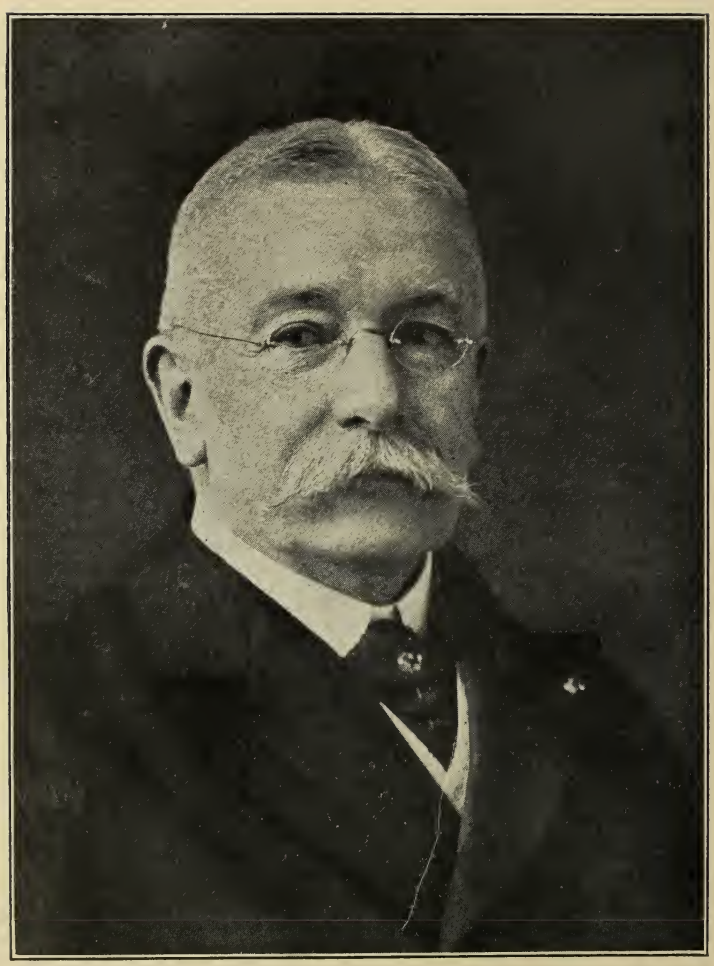
Such were the conditions in the surgical world when Joseph Price entered upon his career. He gave his whole soul to the work. His enthusiasm was beyond control, and he became a militant advocate of the new surgery. With the

courage of a Spartan, with matchless skill and judgment as an operator, he forged to the front and made an aggressive figure on every available field to establish the new surgery. It required courage; it made many enemies; but with him it was a fight for science and humanity. During the years from 1885 to 1900 he was an imposing figure in the medical profession of America. He impressed the profession more by the spoken than the written word, and was a constant attendant upon the medical societies. He addressed county, State, and national societies, and in almost every State of the Union and also in Canada he discussed the surgical problems of the day. But his teaching was most inspiring and forceful at the operating table. His clinic was thronged for years with young, ambitious, and progressive surgeons from every part of the United States.

He stripped from surgery all complicated paraphernalia, and made its technique simple and thorough. Every prominent surgeon in this country to-day demonstrates in his methods the impress of this master surgeon.

Dr. Price was a man of strong physique and remarkable capacity for work. In his personal habits he was temperate and simple. He was possessed of strong convictions and unflinching courage. He made many contributions to the literature of gynecology and abdominal surgery, and throughout his career contributed liberally to the PROCEEDINGS OF THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION. He received numerous honors from the profession, having been elected Chairman of the Section of Gynecology and Obstetrics of the American Medical Association, and also President of the American Association of Obstetricians and Gynecologists. Shortly before his death Union College conferred upon him the honorary degree of LL.D.

Early in his professional career Dr. Price married Miss Louise Troth, of Philadelphia, who, with seven children, survives him. His death was sudden, he having operated on the morning of the same day upon which death overtook him.



WILLIAM WARREN POTTER, M.D.

WILLIAM WARREN POTTER, M.D.

By Lewis S. McMurtry, M.D.
Louisville, Kentucky

Dr. Potter was born at Strykersville, New York, and was the son of a physician. His academic education was received at Genesee College at Lima, New York. He graduated in medicine from the University of Buffalo. Two years after graduation, at the beginning of the Civil War, he offered his services to the government, passed the examinations of the Army Board at Albany, and was commissioned assistant surgeon of the Forty-ninth Regiment of New York Volunteers. He served in the Army of the Potomac under McClellan and Burnside, and was continuously engaged in the field during the Peninsula and Antietam campaigns. While the army was retreating in 1862 he was left in charge of wounded soldiers, was captured and confined in Libby Prison. He was soon exchanged and returned to his regiment, promoted to the rank of surgeon, and served with the Fifty-seventh Regiment during the Chancellorsville and Gettysburg campaigns. After the battle of Gettysburg he was assigned to the first division hospital of the Second Army Corps, and continued in the discharge of that responsible duty until the close of the war. He was breveted Lieutenant Colonel for faithful and meritorious service by the President of the United States, and for like reasons by the Governor of New York. Retiring to civil life he practised medicine for a time at Batavia, New York, but soon removed permanently to Buffalo. During his service in the army of the Potomac

he was associated with our distinguished fellow Dr. Albert Vander Veer, and there was formed that friendship which continued unbroken to the end.

When the medical practice act of 1890 was made effective in the State of New York, Dr. Potter was nominated by the Medical Society of the State of New York for membership on the Board of Examiners, and his name was second on the list of appointees. In 1897 when the new law went into effect his valuable services were recognized by his unanimous election to the presidency of the board, and he was so continued from year to year until his death. In the language of his colleagues of this board, "He was an ideal presiding officer, thoroughly schooled in parliamentary tactics, and ever watchful of the duties reposed in him."

In 1888 Dr. Potter became the editor of the *Buffalo Medical Journal.* This journal was founded in 1845 by Austin Flint, the elder, and has held high rank among the leading monthly medical magazines in America. Dr. Potter discharged the arduous duties of editor and publisher from 1888 until he was overtaken by illness and death. He made the journal the exponent of advanced medical science and the organ of the medical profession of Buffalo and the adjacent section of the great State of New York. Punctilious in language, courteous in every utterance, with comprehensive grasp of the most recent medical literature, his editorial work was of the highest order. He made the journal a medium for diffusing the best in medical literature, and in the editorial department he constantly held aloft the standard of professional honor and achievement. It is impossible to adequately estimate the value and extent of such a service so long and so faithfully discharged, with influences so far-reaching in results.

Dr. Potter made numerous and valuable contributions to medical literature. He was among the first operators in this country to successfully extirpate a large ovarian tumor during pregnancy, with recovery, and followed by delivery

at full term. The report of his case, with comments, was published in the *American Journal of Obstetrics,* and has been widely quoted in gynecological literature. In 1886 he presented a paper to the gynecological section of the American Medical Association at the annual meeting held in Cleveland, Ohio, in which he made a forceful protest against the routine use of the uterine sound, and pointed out how infection and traumatism commonly follow exploration with this apparently simple instrument. He described other and more satisfactory means of diagnosis, and advocated the abolition of its use. This was the first time that the dangers of this instrument were publicly and specifically pointed out. The paper was considered extremely radical at that time, but later Dr. Potter's warning was endorsed by gynecologists generally, and adopted in practice by the profession. All his papers were thoroughly practical, and were written in the choicest language well phrased.

Throughout his entire career Dr. Potter was a close student, and the value of his early training as a military surgeon was manifest in all his undertakings. He was familiar with every new discovery as soon as published, and was always ready to accept advanced knowledge. As a practitioner he was an accurate diagnostician, and resourceful in therapeutics. His surgical work was clean and methodical. Although successful as a practitioner, in his later years he abandoned practice and devoted himself to the academic work of his official positions and his journal.

Dr. Potter was a member of the American Medical Association (chairman of the Section of the Diseases of Women, 1890); Medical Society State of New York (president, 1891); Medical Society County of Erie (president, 1893); Buffalo Medical and Surgical Association (president, 1886); Buffalo Obstetrical Society, 1884–1886; president Section of Gynecology and Abdominal Surgery, First Pan-American Medical Congress, 1893; president of the National Confederation of Medical Examining and Licensing Boards, 1895–1899;

secretary of the American Association of Obstetricians and Gynecologists since 1888; examiner in obstetrics and gynecology, New York State Board of Medical Examiners, and president since 1897.

Dr. Potter was married on March 23, 1859, to Emily A. Bostwick, of Lancaster, New York, who died in 1906. He is survived by two daughters, Mrs. B. G. Tallman and Miss Alice Blanchard Potter, of Buffalo. His only son, Dr. Frank Hamilton Potter, a young physician of superior attainments and fine character, died in 1891.

After an illness of several weeks, Dr. Potter died in Buffalo on March 14, 1911. He received the most devoted attention of his colleagues and friends throughout his illness. The funeral services were attended by official representatives of the State Education Department; the State Board of Medical Examiners; the Medical Society of the County of Erie; the Medical Society of the State of New York, and the Military Order of the Loyal Legion. In accordance with his expressed wishes his body was cremated.

Although reared in the country and inured by military service in early manhood to the hardships of field and camp, Dr. Potter was essentially a city man. He was fond of music, of architecture, of art in general, and readily adapted himself to the changing customs of modern improvement. His literary taste was refined and he was familiar with both classic and modern literature. He possessed delightful social qualities, was a punctilious observer of correct dress and good form upon every occasion, and consequently was a welcome addition to every company he entered. While interesting in conversation, he always was a good listener.

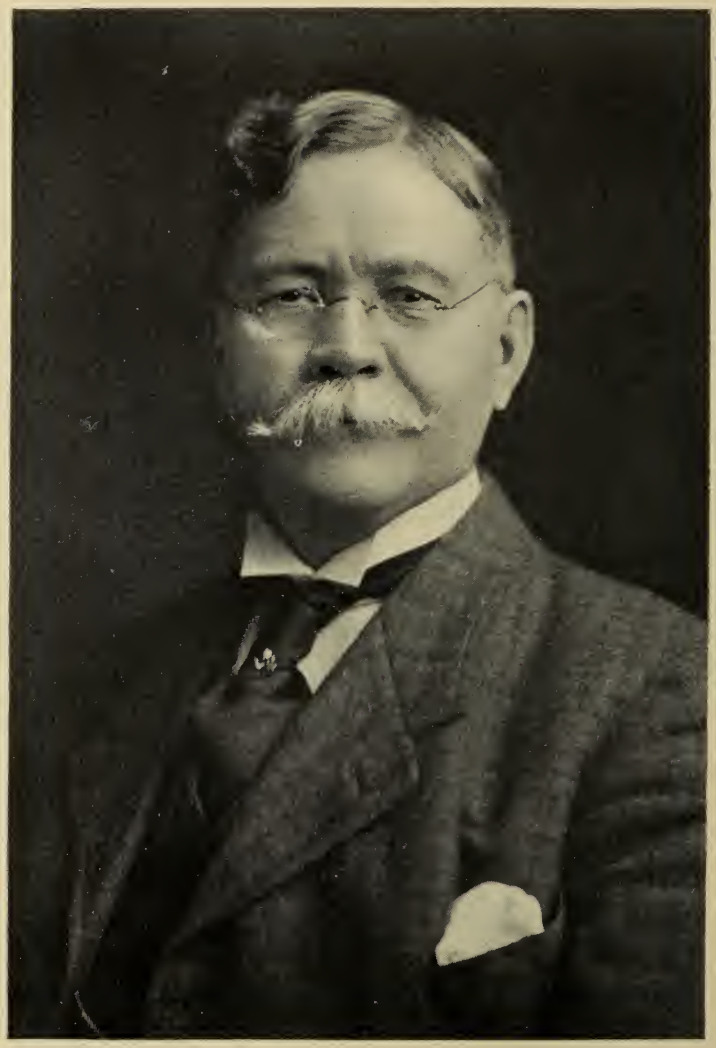
He was loyal to his country, loyal to his State, loyal to his profession, and loyal to his friends. He was a genial gentleman, and an honorable man who worked through the years with an ideal always for good. He served faithfully in every position he held, and did his duty as he understood it always. He was a delightful companion, always cheery,

hopeful, thoughtful, generous, and kind. When his arteries were seventy, his heart was thirty. He was a brave man, and during his long and protracted illness bore himself with courage and self-control.

He will, perhaps, be remembered most warmly and cordially as the Secretary of the American Association of Obstetricians and Gynecologists. He was the moving spirit of the formation of this Association, and throughout twenty-three years he gave it the constant vigilance and efficient supervision which rendered it one of the most flourishing special societies in existence.

As the editor of the *Transactions* he has left a monumental work which reflects the striking advances which have been made in these great specialties in the last quarter of a century.

Dr. Potter rendered to medical science and the medical profession many valuable services through numerous channels, but the most potential and far-reaching of these services was his work as founder, permanent secretary, and editor of the *Transactions of the Association of Obstetricians and Gynecologists.*



ALEXANDER HUGH FERGUSON, M.D.

ALEX. HUGH FERGUSON, M.D., M.B., C.M., F.T.M.S.

1853–1911

Alexander Hugh Ferguson, eminent surgeon and educator, was born February 27, 1853, near the obscure village of Manilla, Victoria County, Ontario Province, Canada. He was the seventh of nine children born to Alexander and Annie (McFadyen) Ferguson, both natives of Argyleshire, Scotland. He first received his education in the common schools of the neighborhood and later attended Rockwood Academy. After graduating from this institution in 1870 he taught in the neighboring schools for two years and then entered Manitoba College, where he studied and served as instructor. Later he took a course in the Medical College of Trinity University at Toronto, where he was graduated in 1881 with high honors, being awarded the first silver medal for the superior excellence of his work and receiving the degrees of M.D., C.M., and also earning by competitive examination a fellowship degree. Not only was he an exceptional scholar but also a great athlete whose prowess especially upon the foot-ball field will be long remembered by his classmates. He received post-graduate training in New York, Glasgow, London, and Berlin. He took a special course at Koch's laboratory, in Berlin.

In 1882 he left a promising practice in Buffalo, N. Y., and went to Winnipeg, Manitoba, primarily to please his aged mother, who was then living there. In the same year he was married to Miss Sarah Jane Thomas, the youngest daughter of Edward Thomas, Esq., of Nassagaweya, Nalton County, Ontario, Canada. Later in the year he was

appointed registrar of the College of Physicians and Surgeons of Manitoba, and in the following year he took the initiative in founding Manitoba Medical College, which stands today as a splendid exemplification of his far-sighted judgment. In this institution he was professor of physiology and histology for three years, and professor of surgery from 1886 to 1894. During the same time he was a member of the medical staffs of various hospitals, including the Winnipeg General Hospital and St. Boniface Hospital, of which he was surgeon-in-chief. At this period he was chosen as the first president of the Manitoba (pioneer) Branch of the British Medical Association.

The deep devotion, high respect, and great admiration in which he was held both as a man and as a surgeon, by the Canadian people of the medical profession and of the laity alike, was strikingly and beautifully expressed by numerous engrossed addresses presented to him when leaving Canada to enter upon a new and widened field of work in Chicago. So beloved was he that the press and the people referred to his departure as a "public calamity," and the hospitals with which he had been connected refused to accept the resignation he tendered and his name remained upon their respective staffs up to the time of his death.

Dr. Ferguson began his career in Chicago in 1894, when he accepted a professorship of surgery in the Chicago Post-Graduate School. His great ability as a surgeon and his rare qualities as a teacher soon won for him an enviable recognition and reputation, a very large following, and marked success. In a short time he had established himself in a place of the first professional eminence, and up to the time of his death was an active and conspicuous figure in the medical and surgical work of Chicago. In 1900 he accepted the offer of a professorship of clinical surgery at the College of Physicians and Surgeons, the medical department of the University of Illinois. In the same year Dr. Ferguson purchased the Chicago Hospital, to which insti-

tution he acted as president and surgeon-in-chief until September, 1910, when he disposed of his interests. Besides the offices he held in the foregoing institutions he was surgeon to the Chicago Post-Graduate Hospital and to the Cook County Hospital for the Insane, at Dunning, Ill., and was consulting surgeon to the Cook County Hospital and to the Mary Thompson Hospital. In 1911 he was appointed First Lieutenant, U. S. A. of the Medical Reserve Corps.

The indefatigable student in his library, the genius in his clinic, Dr. Ferguson was also a leader in the medical society world. For the year 1910 he was elected president of the Chicago Medical Society by a large majority. Previous to this, in 1901, he had acted as first vice president to the same society. He has also held the office of president of the Manitoba (pioneer) Branch of the British Medical Association, the Western Surgical and Gynecological Society, and the Tri-State Medical Society (Illinois, Iowa, Missouri). Of the Michigan State Medical Society, the Military Tract Medical Society, and the Wayne County (Michigan) Medical Society, he was an honorary member. He joined the Southern Surgical and Gynecological Association in 1900. He was a charter member of the International Surgical Society, a life member of the Chicago Medical Society, and Fellow of the American Surgical Association, the American Association of Gynecologists and Obstetricians, the Western Surgical and Gynecological Association, the Chicago Surgical Society, the Chicago Academy of Medicine, the American Urological Society, the Chicago Urological Society, and the Chicago Gynecological Society. He was also enrolled as a member of the American Medical Association, the Illinois State Medical Association, the British Medical Association, and the Chicago Neurological Society.

Outside of the purely professional field Dr. Ferguson also took a prominent part. He was Commander of the Order of Christ of Portugal, a thirty-second degree Mason, an honorary member of the Alpha Omega Alpha and the

Phi Rho Sigma fraternities, president of the Nicholas Senn Club, a life member of the Chicago Press Club, an honorary member of the North Side Physicians' Club, and a member of the University Club of Chicago, the South Shore Country Club of Chicago, the Illinois St. Andrew Society, the Physicians' Club of Chicago, the Western Economic Society, and the National Economic League. In religion he was a Presbyterian, and was a member of the First Presbyterian Church at Chicago.

Dr. Ferguson was one of the great surgeons of his time. His achievements in surgery, his valuable contributions to medical literature, and the numerous instruments of his invention have enriched both the medical profession and the public; their influence will be felt upon the medical world. He not only originated a number of major operations, but produced new procedures along other surgical lines that were decided advances. The Ferguson operation for hernia, a radical departure from all prior surgical procedures for the cure of hernia, attracted attention and recognition. His original work on hydatids of the liver has been probably the most extensive of that of any man in America and was instrumental in first bringing him into notice. He was one of the first to propose the operation for decortication of the kidney in chronic Bright's disease. He described an ingenious operation for anterior transplantation of the round ligaments for backward displacement of the uterus at the 1901 meeting of the Southern Surgical and Gynecological Association. The operation for the removal of the superior maxilla through the mouth was extensively written of by him. He was instrumental in bringing to their present state of perfection the operations for cleft palate, goitre, gallstones, of prostatectomy, nephropexy, gastro-enterostomy, and others.

Although not a voluminous writer, he was the author of many valuable articles on surgical subjects and a number of masterful addresses. In 1908 his book entitled *The Tech-*

nique of Modern Operations for Hernia appeared, which was well received by the profession and will be a meritorious monument to its author. His writings teemed with meaty expressions. He was invited to read a paper on "Parasites and Tumors of the Lung and Pleura" before the International Surgical Society at Brussels, Belgium, in September, 1911, but was prevented from doing so by the illness which resulted in his death in October of the same year.

As an operator he was gifted with great dexterity. His ingenuity in meeting in a practical and scientific manner emergent indications, unforeseen complications, or anomalous conditions was a factor in determining his success as an operator. His accuracy in diagnosis, his wealth of experimental knowledge, his keen powers of observation and concentration were noteworthy.

Dr. Ferguson was not only a master surgeon but also and above all a conscientious, generous, tender-hearted, and courageous man, a genial, true friend, and a devoted father and husband. He was simple and sincere in all his relations in life. Despite his many cares and responsibilities he ever carried with him an atmosphere of cheeriness and kindliness.

After a prolonged and painful illness of three months' duration, through which he fought a courageous battle, Dr. Ferguson succumbed on October 20, 1911, at his residence in Chicago, to general septicemia and other complications resulting from a carbuncle.

He is survived by a widow and two sons, Ivan H. Ferguson and Alexander D. Ferguson.

"Strong to the end, a man of men, from out of strife he passed;
The grandest hour of all his life was that of earth the last."

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